



INTEGRATED
Environmental Services, Inc.

April 13, 1998

Via Facsimile and Federal Express

James E. Ross, P.E.
Unit Chief, Site Cleanup Unit
Regional Water Quality Control Board
Los Angeles Region
101 Center Plaza Drive
Monterey Park, CA 91754-2156

Subject: Response to RWQCB Memo re. Post-Demolition Risk Assessment, March 31, 1998

Project: Boeing C-6 Facility, Parcel A, Los Angeles (RWQCB File No. 100.315)

Dear Mr. Ross:

On behalf of Boeing Realty Corporation, Integrated Environmental Services Inc. is pleased to submit for your review the attached document pertaining to the C-6 facility, Parcel A. We are delighted to report that the incorporation of the Regional Water Quality Control Board's (RWQCB's) review comments has resulted in a reduction of projected risks. However, the fundamental finding of the risk assessment, "no significant risk," has not been altered. The proposed change pages for the RWQCB comments have been enclosed for your review. In addition, this document has been prepared so that it may be incorporated into the final post-demolition risk assessment front matter.

Comment 1: Our Calculation for the following equations, using the data provided, indicated the following:

<u>Equation</u>	<u>Site-specific soil parameters</u>	<u>PDRA soil parameters</u>
5-5 (g/cm3)	1.45E-3	2.63E-3
5-12 (mg/cm2-s)	2.32E-15	7.32E-13

Please provide recalculations of the above and enter the appropriate values.

Response: Equation 5-5 of the post-demolition risk assessment should read as follows:

$$K_{as} = H'/(R \times T \times K_d) \quad (5-5)$$

where

- H' = COPC-specific Henry's Law constant (atm-m³/mol), from Table 5-3
R = ideal gas constant, 8.206 x 10⁻⁵ atm-m³/mol/K
T = temperature in Kelvin, 293 K
K_d = soil-to-water partitioning coefficient (cm³/g), K_{OC} from Table 5-3 times fraction of organic carbon in soil matrix, 0.004 unitless (Cal/EPA 1994)



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Integrated has provided a change page (5-12) to address these corrections. The K_{as} values calculated in the post-demolition risk assessment and the response to RWQCB's March 11, 1998 review comments are correct.

Integrated concurs with RWQCB findings for the calculated flux rates presented in Section 5 of the post-demolition risk assessment and the response to RWQCB comments dated March 20, 1998. The unit conversion factor presented in equation 5-12 was not included in the calculation of AOPC flux rates. The impact of this inadvertent omission was to overestimate potential risks by three orders of magnitude for exposures to outdoor air. Cumulative effects on the findings of the post-demolition risk assessment and associated potential health impacts are insignificant. However, the proposed change pages (5-20, 5-23, 6-12, 8-3, and Appendix B) have been enclosed to allow the reviewer to replicate the exposure assessment process.

Comment 2: The following revisions must be made in the report:

1. *The March 20, 1998, response stated that "The D'Agostino's test results were inconclusive..." and this determination should be stated in the final report page 5-5, and any other relevant sections in the report. Please also clearly describe the determination of data distribution in the report, i.e., that the determination is based on histogram plots, not on the results of the D'Agostino's test.*

Response: Text has been added to pages 5-4 and 5-5. The proposed change pages are enclosed.

2. *Units expressed in equation 6-2 are inconsistent in the March 6, 1998, report. The unit for VF and PF should be in m³/kg.*

Response: The units have been corrected on pages 6-4 and 6-5. The proposed change pages are enclosed.

3. *Henry's law constant H expressed in equation 5-5 should be denoted as H' to be consistent with Table 5-3.*

Response: The "prime" mark has been added in the equation to be consistent with Table 5-3. The proposed change page 5-12 is enclosed.

Comment 3: The response to our March 11, 1998 letter shall be incorporated into the final report, to demonstrate the conservative approach used in this project.

Response: Integrated is restating the comparative analysis conducted in response to RWQCB's March 11, 1998, review comments. This response to comments document should be included in the front matter of the post-demolition risk assessment. The calculated values for equation 5-12 have been corrected in accordance with RWQCB comment 1, above.

March 11, 1998 RWQCB Comment 2: Please use site-specific soil physical data (soil bulk density = 1.87 g/cm³, water filled porosity = 0.37(-), and air filled porosity 0.06 (-)) to recalculate equations (5-1), (5-5), (5-11) and (5-12) for COPC tetrachloroethylene (Koc = 660 mL/g and H=0.957(-)), and tabulate the results in comparison with the current results in the report.



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Response: As presented in the subject document and in communications between Integrated and RWQCB staff, DTSC-HERD default soil parameters were used to conservatively estimate the rate of emissions from the site soils. Based on the use of these more conservative parameters, this approach ensures that the emissions estimated for the site are not underestimated. The following table has been assembled for the requested comparison (corrected in accordance with Comment 1 above):

Equation of Interest	Site-Specific Soil Parameters	DTSC-HERD Soil Parameters
5-1 Volatilization Factor (m^3/kg)	1.06E+04	3.02E+02
5-5 Soil-to-Air Partitioning Coefficient (g/cm^3)	3.60E-01	6.57E-01
5-11 Soil Gas Concentration (mg/L)	4.14E-06	7.51E-06
5-12 Vapor Flux ($mg/cm^2\text{-sec}$)	2.32E-15	7.32E-13

As shown in the comparison table, the DTSC-HERD values used in the risk assessment are significantly more conservative than the site-specific data for the estimation of emissions. As mentioned in communications with Water Board staff, the most sensitive equations to the parameters identified by the RWQCB are 5-4 and 5-13, the calculation of the chemical-specific effective diffusivity (Dei). The Dei estimated in the risk assessment represents a two-order-of magnitude higher estimated diffusion rate through the soils.

I appreciate the opportunity to work closely with you and your staff on this important project. Should you or your staff have any further questions concerning the Post-Demolition Risk Assessment, please feel free to call me directly at (714) 852-9050, extension 20.

Sincerely,

Chris Stoker
Program Manager

CC: S. Mario Stavale, Boeing



- Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual, Part A (EPA 1989a)
- Statistical Methods for Evaluating the Attainment of Cleanup Standards, Volume 1 (EPA 1989b)
- Statistical Methods for Environmental Pollution Monitoring (Gilbert 1987)
- Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities (EPA 1989c)

For each soil COPC, statistical summaries were developed, including the arithmetic mean, standard error of the arithmetic mean, minimum measured concentration, maximum measured concentration, frequency of detection, D'Agostino's test and histograms for distribution, fit testing, and 95 percent upper confidence limit (UCL) of the mean (see Appendices C and D). The applicability of D'Agostino's test and the 95 percent UCL of the mean is discussed below. First, however, an approach for the assignment of values for non-detected results is addressed.

5.2.1 Treatment of Non-Detected Constituents

Every analytical technique used to measure the concentration of constituents has an associated limit of detection (LOD) and limit of quantification (LOQ). A constituent that was not detected in a sample is below the LOD. A constituent that was detected but in such low amounts that its concentration could not be accurately determined is below the LOQ. When a constituent is reported as not detected in a sample, the actual concentration is any value up to the LOD.

For this post-demolition risk assessment, when a constituent was found in some of the samples and was not clearly spatially limited, it is assumed to exist in samples in which it was not detected. The assignment of a value of one-half the detection limit (if the constituent is normally distributed), or the detection limit divided by the square root of 2 (if the constituent is lognormally distributed), or the LOD to all samples reported as not detected reflects the assumption that the samples are equally likely to have any value up to the detection limit. Furthermore, when the sample values above the LOQ are lognormally distributed, it is:



reasonable to assume that values below the LOQ are also lognormally distributed, and the reported detection limit divided by the square root of 2 should be assigned as a proxy value (Cal/EPA 1992, EPA 1988a, 1988b).

5.2.2 Determination of Data Distribution

The data set distribution must be determined prior to the application of any statistical methods. This minimizes the effect of data biasing. D'Agostino's test (Gilbert 1987) is an effective method for testing whether a data set has been drawn from an underlying normal distribution (see Appendix D). Conducting the test on the logarithms of the data is an equally effective way of evaluating the hypothesis of a lognormal distribution. Distribution histograms were developed when D'Agostino's test was found to be inconclusive. The data sets for the post-demolition risk assessment were found to best fit the lognormal distribution and were statistically evaluated in this manner.

5.2.3 Use of 95 Percent Upper Confidence Limit Concentrations

Due to the uncertainty associated with characterizing potentially heterogeneous media, the 95 percent UCL for either a normal or lognormal distribution must be used to represent constituent concentrations (Cal/EPA 1992, EPA 1988a, 1988b). As previously mentioned, the Parcel A data were determined to be lognormally distributed. Thus, the upper 95 percent UCL for lognormal distribution was used for soil source-term concentrations (see Appendix D).

Tables 5-1 and 5-2 summarize the 95 percent UCL concentrations for the soil COPCs by AOPC as calculated for direct exposures (0 to 12 feet bgs) and long-term fate and transport modeling (0 to 50 feet bgs). It is important to note that when the 95 percent UCL exceeded the maximum detected value, the maximum detected value was used. This approach is consistent with DTSC guidance (Cal/EPA 1994).

The values presented in Tables 5-1 and 5-2 are used throughout the post-demolition risk assessment.



$$D_{ei} = D_i \times (P_a^{3.33}/P_t^2) \quad (5-4)$$

where

- D_i = COPC-specific diffusivity of COPC in air (cm^2/sec), from Table 5-3
 P_a = air filled porosity of soil matrix, 0.284 (unitless) (Cal/EPA 1994)
 P_t = total porosity of soil matrix, 0.434 (unitless) (Cal/EPA 1994)

The soil-to-air partition coefficient, K_{as} , was derived from the COPC-specific soil-water partition coefficient and Henry's Law constant:

$$\underline{\underline{K_{as} = H'/(R \times T \times K_d)}} \quad (5-5)$$

where

- H' = COPC-specific Henry's Law constant ($\text{atm}\cdot\text{m}^3/\text{mol}$), from Table 5-3
 R = ideal gas constant, $8.206 \times 10^{-5} \text{ atm}\cdot\text{m}^3/\text{mol}\cdot\text{K}$
 T = temperature in Kelvin, 293 K
 K_d = soil-to-water partitioning coefficient (cm^3/g), K_{oc} from Table 5-3 times the fraction of organic carbon (foc), 0.004 (unitless)

The intermediate conversion factor, Z, in the volatilization attenuation factor was calculated as:

$$Z = (D_{ei} \times P_a) / [P_a + (ps \times (1-P_a)/K_{as})] \quad (5-6)$$

where

- D_{ei} = effective diffusivity of a COPC through a soil matrix (cm^2/sec)
 P_a = air filled porosity of the soil matrix, 0.284 (unitless) (Cal/EPA 1994)
 ps = true soil or particle density, 1.5 g/cm^3 (Cal/EPA 1994)
 K_{as} = soil-to-air partition coefficient ($\text{g soil}/\text{cm}^3 \text{ air}$)

A summary of the calculated volatilization attenuation factors is presented in Table 5-4.



maximum off-site impact for each COPC. Additional discrete receptor points have been located along the northern boundary of the residential development to the south of the Boeing property. These receptors have been used to estimate maximum off-site residential exposure concentrations. The flagpole receptor option in the ISCST3 model was used to place the grid points 1.5 meters above the ground—the approximate breathing height of a typical adult.

TABLE 5-5
COPC FLUX RATES BY SOURCE (mg/cm² sec)

COPC	AOPC 1	AOPC 2
1,1-dichloroethene	<u>3.51E-11</u>	<u>8.75E-11</u>
1,2,4-trimethylbenzene	<u>3.68E-14</u>	<u>1.83E-13</u>
1,3,5-trimethylbenzene	<u>1.07E-13</u>	<u>3.18E-13</u>
aroclor 1248	NV	NV
<u>aroclor 1254</u>	<u>NV</u>	<u>NV</u>
aroclor 1260	NV	NV
<u>arsenic</u>	<u>NV</u>	<u>NV</u>
benzo(a)anthracene	NV	NV
benzo(a)pyrene	NV	NV
benzo(b)fluoranthene	NV	NV
<u>benzo(k)fluoranthene</u>	<u>NV</u>	<u>NV</u>
bis(2-ethylhexyl)phthalate	NV	NV
chrysene	NV	NV
dibenzo(a,h)anthracene	NV	NV
fluoranthene	NV	NV
<u>indeno(1,2,3-cd)pyrene</u>	<u>NV</u>	<u>NV</u>
naphthalene	NV	NV
n-butylbenzene	<u>4.77E-14</u>	<u>9.70E-14</u>
n-propylbenzene	<u>1.36E-13</u>	<u>3.12E-13</u>
p-cymene	<u>8.24E-15</u>	<u>1.80E-14</u>
phenanthrene	NV	NV
pyrene	NV	NV
tetrachloroethylene	<u>7.32E-13</u>	<u>1.06E-12</u>
trichloroethene	<u>8.74E-13</u>	<u>3.35E-12</u>
xylenes	<u>9.11E-14</u>	<u>1.91E-13</u>

NV = Not Volatile



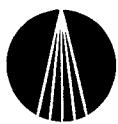
Air Dispersion Modeling Results

The ISCST3 results for the maximum on- and off-site COPC, concentrations in air are summarized in Table 5-6. The modeling output files are provided in Appendix A.

TABLE 5-6
MODELED MAXIMUM ON-SITE AND OFF-SITE
COPC CONCENTRATIONS IN AIR (mg/m³)

COPC	Maximum On-Site Concentration	Maximum Off-Site Concentration	Maximum Residential Concentration
1,1-dichloroethene	<u>1.24E-05</u>	<u>6.57E-06</u>	<u>3.65E-08</u>
1,2,4-trimethylbenzene	<u>2.38E-08</u>	<u>7.04E-09</u>	<u>3.83E-11</u>
1,3,5-trimethylbenzene	<u>4.37E-08</u>	<u>2.01E-08</u>	<u>1.11E-10</u>
aroclor 1248	NV	NV	NV
<u>aroclor 1254</u>	<u>NV</u>	<u>NV</u>	<u>NV</u>
aroclor 1260	NV	NV	NV
<u>arsenic</u>	<u>NV</u>	<u>NV</u>	<u>NV</u>
benzo(a)anthracene	NV	NV	NV
benzo(a)pyrene	NV	NV	NV
benzo(b)fluoranthene	NV	NV	NV
<u>benzo(k)fluoranthene</u>	<u>NV</u>	<u>NV</u>	<u>NV</u>
bis(2-ethylhexyl)phthalate	NV	NV	NV
chrysene	NV	NV	NV
dibenzo(a,h)anthracene	NV	NV	NV
fluoranthene	NV	NV	NV
<u>indeno(1,2,3-cd)pyrene</u>	<u>NV</u>	<u>NV</u>	<u>NV</u>
naphthalene	NV	NV	NV
n-butylbenzene	<u>1.43E-08</u>	<u>8.90E-09</u>	<u>4.96E-11</u>
n-propylbenzene	<u>4.48E-08</u>	<u>2.54E-08</u>	<u>1.41E-10</u>
p-cymene	<u>2.61E-09</u>	<u>1.54E-09</u>	<u>8.57E-12</u>
phenanthrene	NV	NV	NV
pyrene	NV	NV	NV
tetrachloroethylene	<u>1.70E-07</u>	<u>1.36E-07</u>	<u>7.61E-10</u>
trichloroethene	<u>4.46E-07</u>	<u>1.66E-07</u>	<u>9.09E-10</u>
xylenes	<u>2.79E-08</u>	<u>1.70E-08</u>	<u>9.47E-11</u>

NV = Not Volatile



The exposure pathways of concern for the construction worker are: 1) inhalation of VOCs and particulate, 2) incidental ingestion of soil, and 3) dermal contact with soil. The example calculation methodology applies to all receptors associated with the Parcel A exposure scenarios; however, appropriate exposure parameters for other receptors would be substituted where applicable.

6.1.1 Air Exposures - Inhalation

Equation 6-16 from RAGS (EPA 1989a) was used to quantify intake from the inhalation pathway:

$$I_a = (C_a)(IR)(ET)(EF)(ED) / (BW)(AT) \quad (6-1)$$

where

- I_a = intake from inhalation of a COPC in air (mg/kg-d)
 C_a = concentration of COPC in air (mg/m³)
IR = inhalation rate (m³/h)
ET = exposure time (h/d)
EF = exposure frequency (d/y)
ED = exposure duration (y)
BW = body weight (kg)
AT = averaging time (d), ED x 365d/y (noncarcinogens), 70y x 365d/y (carcinogens)

The COPC concentration in air, C_a , was calculated separately for the construction and commercial/industrial emissions cases, as follows:

Construction Emissions Case

$$C_a = (C_s)(1/VF + 1/PF) \quad (6-2)$$

- C_s = concentration of COPC in soil (mg/kg), from Table 5-1
VF = volatilization factor (m³/kg), from Table 5-4



PF = particulate attenuation factor, $4.77 \times 10^9 \text{ m}^3/\text{kg}$

Commercial/Industrial Emissions Case

$$C_a = C_i + C_o \quad (6-3)$$

C_i = modeled indoor air concentration (mg/m^3), from Table 5-7

C_o = maximum modeled on-site COPC concentration (mg/m^3), from Table 5-6

As mentioned, the on-site construction worker's exposure to benzene is used as an example. The construction worker's intake (I_a) resulting from inhaling air hypothetically containing 1 milligram benzene per cubic meter air (C_a) is calculated as follows (see Table 6-1 for exposure parameters and sources). The inhalation rate (IR) for an active adult is 2.5 cubic meters per hour. The total exposure time (ET) is 8 hours per day for on-site exposures. The exposure duration (ED) is 1 year, and the exposure frequency (EF) is 250 days per year. The body weight (BW) for the adult resident is 70 kilograms. Since benzene is a carcinogen, the exposure is averaged over a 70-year lifetime (AT = 25,550 d). The exposure would be averaged over the period of exposure for all noncarcinogenic exposures (AT = ED x 365). Substituting these values into Equation 6-1 yields:

$$I_a = (1.0 \text{ mg/m}^3)(2.5 \text{ m}^3/\text{h})(8 \text{ h/d})(250 \text{ d/y})(1 \text{ y}) / (70\text{kg})(25550 \text{ d}) \quad (6-4)$$

or

$$I_a = 2.80 \times 10^{-3} \text{ mg/kg-d}$$

Appendix B presents the complete calculation sheets for inhalation exposures.

1.1.1 Soil Exposures - Incidental Ingestion

Equation 6-14 from RAGS (EPA 1989a) was used to quantify intake from the ingestion pathway:



6.3 RISKS POSED BY THE POST-DEMOLITION EXPOSURE SCENARIOS

Table 6-3 presents the total HI and total ILCR results for each AOPC and receptor studied under the Parcel A post-demolition exposure scenarios. Because the reasonable maximum exposure (RME) approach was used to quantify potential health impacts, it should be noted that if the estimated health effects of the RME are within acceptable limits, then it is likely that all other, lesser exposures related to Parcel A are also within these limits. See Section 4.1.3 for more information on RME.

Each entry in the Table 6-3 is supported by detailed calculations of health effects by receptor, COPC, and pathway (see Appendix B).

TABLE 6-3
SUMMARY OF POST-DEMOLITION HEALTH RISK,
C-6 FACILITY, PARCEL A

On-Site Receptors	HI	ILCR
AOPC 1		
Construction Worker	5.1E-02	1.4E-06
Commercial/Industrial Worker, RME ^a	6.4E-05	1.2E-10
Commercial/Industrial Worker, Upper Bound ^b	4.6E-03	4.4E-06
AOPC 2		
Construction Worker	1.5E-02	7.7E-07
Commercial/Industrial Worker, RME ^a	8.7E-05	1.7E-10
Commercial/Industrial Worker, Upper Bound ^b	1.0E-03	2.5E-06
Off-Site Receptors	HI	ILCR
Commercial/Industrial Worker	2.5E-05	5.2E-11
Resident Adult	1.2E-06	2.9E-12
Resident Child	5.5E-06	2.7E-12

NOTES:

^aReasonable Maximum Exposure conditions, assumes 2-foot layer of clean fill.

^bUpper Bound exposure conditions, assumes no layer of fill.

AOPC = Area of Potential Concern

HI = Hazard Index

ILCR = Incremental Lifetime Cancer Risk

Table B-1
Summary of Potential Health Effects
On-Site Construction Worker AOPC 1

<u>Exposure Pathway</u>	Receptor Hazard Quotient
Inhalation of Particulates and Volatiles	3.5E-03
Incidental ingestion of soils	3.1E-02
Dermal contact with soils	1.7E-02
Total Population Hazard Quotient =	5.1E-02

<u>Exposure Pathway</u>	Receptor Incremental Lifetime Cancer Risk
Inhalation of Particulates and Volatiles	8.1E-10
Incidental ingestion of soils	6.0E-07
Dermal contact with soils	8.2E-07
Total Population Incremental Lifetime Cancer Risk =	1.4E-06

Table B-2
Summary of Unit Risk Characterization
On-Site Construction Worker AOPC 1
Via Incidental Ingestion of Soils

Intake Equation	=	CS X EF X ED X CF X IR BW X AT	
IRs	Ingestion rate of soil (RAGS, 1989)	480 mg/day	
CF	Conversion factor	1.0E-06 kg/mg	
EF	Exposure frequency	250 d/year	
EDn	Exposure duration for non-carcinogens	1 year	
EDc	Exposure duration for carcinogens	1 year	
BW	Body weight	70 kg	
ATc	Average time for carcinogens (lifetime)	25530 day	
ATn	Average time for non-carcinogens (EDn x 365)	365 day	
CS	Concentration of chemicals in soil (see Table 5-1)		
Chemical Concentrations			
Compound	Concentration	Concentration	
1,1-dichloroethene	2.57E-03	naphthalene	2.05E-01
1,2,4-trimethylbenzene	3.82E-03	n-butylbenzene	2.81E-03
1,3,5-trimethylbenzene	2.96E-03	n-propylbenzene	2.57E-03
aroclor 1248	3.69E-02	p-cymene	2.47E-03
aroclor 1254	3.28E-02	phenanthrene	2.03E-01
aroclor 1260	2.08E-02	pyrene	3.12E-01
arsenic	1.56E-00	tetrachloroethene	2.69E-03
benzo(a)anthracene	2.43E-01	trichloroethene	2.63E-03
benzo(a)pyrene	3.39E-01	xylenes	2.34E-03
benzo(b)fluoranthene	3.91E-01		
benzo(k)fluoranthene	3.06E-01		
bis(2-ethylhexyl)phthalate	2.58E-01		
chrysene	2.86E-01		
dibenzof(a,h)anthracene	1.36E-01		
fluoranthene	2.66E-01		
indeno(1,2,3-cd)pyrene	3.33E-01		

Table B-2 (cont.)
Summary of Unit Risk Characterization
On-Site Construction Worker AOPC 1
Via Incidental Ingestion of Soils

Non-Carcinogenic Calculation				Carcinogenic Calculation			
Compound	CDI (mg/kg-d)	RfD (mg/kg-d)	HQ (unitless)	CDI (mg/kg-d)	CSF (mg/kg-d) ₋₁	ILCR (unitless)	
1,1-dichloroethene	1.21E-08	9.00E-03	1.34E-06	1.72E-10	NA	NA	
1,2,4-trimethylbenzene	1.79E-08	5.00E-01	3.59E-08	2.56E-10	NA	NA	
1,3,5-trimethylbenzene	1.39E-08	5.00E-01	2.78E-08	1.99E-10	NA	NA	
aroclor 1248	1.73E-07	7.00E-05	2.48E-03	2.48E-09	7.70E+00	1.91E-08	
aroclor 1254	1.54E-07	7.00E-05	2.20E-03	2.20E-09	7.70E+00	1.69E-08	
aroclor 1260	9.77E-08	7.00E-05	1.40E-03	1.40E-09	7.70E+00	1.07E-08	
arsenic	7.33E-06	3.00E-04	2.44E-02	1.05E-07	1.50E+00	1.57E-07	
benzo(a)anthracene	1.14E-06	4.00E-02	2.85E-05	1.63E-08	1.15E+00	1.87E-08	
benzo(a)pyrene	1.59E-06	4.00E-02	3.98E-05	2.27E-08	1.15E+01	2.62E-07	
benzo(b)fluoranthene	1.84E-06	4.00E-02	4.59E-05	2.62E-08	1.15E+00	3.02E-08	
benzo(k)fluoranthene	1.44E-06	4.00E-02	3.59E-05	2.05E-08	1.15E+00	2.36E-08	
bis(2-ethylhexyl)phthalate	1.21E-06	2.00E-02	6.06E-05	1.73E-08	8.40E-03	1.45E-10	
chrysene	1.34E-06	4.00E-02	3.36E-05	1.92E-08	1.15E-01	2.21E-09	
dibenz(a,h)anthracene	6.39E-07	4.00E-02	1.60E-05	9.12E-09	4.10E+00	3.74E-08	
fluoranthene	1.25E-06	4.00E-01	3.12E-06	1.78E-08	NA	NA	
indeno(1,2,3-cd)pyrene	1.56E-06	4.00E-02	3.91E-05	2.23E-08	1.15E+00	2.57E-08	
naphthalene	9.63E-07	4.00E-02	2.41E-05	1.38E-08	NA	NA	
n-butylbenzene	1.32E-08	1.00E-01	1.32E-07	1.89E-10	NA	NA	
n-propylbenzene	1.21E-08	1.00E-01	1.21E-07	1.72E-10	NA	NA	
p-cymene	1.16E-08	1.00E-01	1.16E-07	1.66E-10	NA	NA	
phenanthrene	9.53E-07	3.00E-01	3.18E-06	1.36E-08	NA	NA	
pyrene	1.47E-06	3.00E-01	4.88E-06	2.09E-08	NA	NA	
tetrachloroethene	1.26E-08	1.00E-01	1.26E-07	1.80E-10	5.10E-02	9.20E-12	
trichloroethene	1.24E-08	7.35E-03	1.68E-06	1.76E-10	1.50E-02	2.65E-12	
xylenes	1.10E-08	2.00E+00	5.50E-09	1.57E-10	NA	NA	
HQ Summation =			3.1E-02				
ILCR Summation =					6.0E-07		

Table B-3
Summary of Unit Risk Characterization
On-Site Construction Worker AOPC 1
Via Dermal Contact with Soils

$$\text{Intake Equation} = \frac{\text{CS} \times \text{CF} \times \text{EF} \times \text{ED} \times \text{AF} \times \text{ABS} \times \text{SA}}{\text{BW} \times \text{AT}}$$

SA	Surface area of exposed skin (50th percentile, hands only)	5600 cm ² /day
AF	Adherence Factor	1 mg/cm ²
ABS	Absorption factor (see table below)	csy
CF	Conversion factor	1.0E-06 kg/mg
EF	Exposure frequency	250 dry year
EDn	Exposure duration for non-carcinogens	1 year
EDc	Exposure duration for carcinogens	1 year
BW	Body weight	70 kg
ATc	Average time for carcinogens (lifetime)	2550 day
ATn	Average time for non-carcinogens (EDn × 365)	365 day
CS	Concentration of chemicals in soil (see Table 5-1)	

Chemical Concentrations

Compound	ABS (unitless)	Concentration (mg/kg)	Compound	ABS (unitless)	Concentration (mg/kg)
1,1-dichloroethene	1.00E-01	2.57E-03	naphthalene	1.50E-01	2.05E-01
1,2,4-trimethylbenzene	1.00E-01	3.82E-03	n-butylbenzene	1.00E-01	2.81E-03
1,3,5-trimethylbenzene	1.00E-01	2.96E-03	n-propylbenzene	1.00E-01	2.57E-03
aroclor 1248	1.00E-01	3.69E-02	p-cymene	1.00E-01	2.47E-03
aroclor 1254	1.00E-01	3.28E-02	phenanthrene	1.50E-01	2.03E-01
aroclor 1260	1.00E-01	2.08E-02	pyrene	1.50E-01	3.12E-01
arsenic	3.00E-02	1.56E+00	tetrachloroethene	1.00E-01	2.69E-03
benzo(a)anthracene	1.50E-01	2.43E-03	trichloroethene	1.00E-01	2.63E-03
benzo(a)pyrene	1.50E-01	3.39E-01	xylenes	1.00E-01	2.34E-03
benzo(b)fluoranthene	1.50E-01	3.91E-01			
benzo(k)fluoranthene	1.50E-01	3.06E-01			
bis(2-ethylhexyl)phthalate	1.00E-01	2.58E-01			
chrysene	1.50E-01	2.86E-01			
dibenzo(a,h)anthracene	1.50E-01	1.36E-01			
fluoranthene	1.00E-01	2.66E-01			
indeno(1,2,3-cd)pyrene	1.00E-01	3.33E-01			

Table B-3 (cont.)
Summary of Unit Risk Characterization
On-Site Construction Worker AOPC 1
Via Dermal Contact with Soils

Compound	Non-Carcinogenic Calculation			Carcinogenic Calculation		
	CDI (mg/kg-d)	RfD (mg/kg-d)	HQ (unitless)	CDI (mg/kg-d)	CSF (mg/kg-d) ₁	ILCR (unitless)
1,1-dichloroethene	1.46E-08	9.00E-03	1.62E-06	2.08E-10	NA	NA
1,2,4-trimethylbenzene	2.17E-08	5.00E-01	4.34E-08	3.10E-10	NA	NA
1,3,5-trimethylbenzene	1.68E-08	5.00E-01	3.36E-08	2.40E-10	NA	NA
aroclor 1248	2.09E-07	7.00E-05	2.99E-03	2.99E-09	7.70E+00	2.30E-08
aroclor 1254	1.86E-07	7.00E-05	2.66E-03	2.66E-09	7.70E+00	2.05E-08
aroclor 1260	1.18E-07	7.00E-05	1.69E-03	1.69E-09	7.70E+00	1.30E-08
arsenic	2.66E-06	3.00E-04	8.85E-03	3.79E-08	1.50E+00	5.69E-08
benzo(a)anthracene	2.07E-06	4.00E-02	5.17E-05	2.96E-08	1.15E+00	3.40E-08
benzo(a)pyrene	2.89E-06	4.00E-02	7.21E-05	4.12E-08	1.15E+01	4.74E-07
benzo(b)fluoranthene	3.33E-06	4.00E-02	8.32E-05	4.75E-08	1.15E+00	5.47E-08
benzo(k)fluoranthene	2.60E-06	4.00E-02	6.51E-05	3.72E-08	1.15E+00	4.28E-08
bis(2-ethylhexyl)phthalate	1.46E-06	2.00E-02	7.32E-05	2.09E-08	8.40E-03	1.76E-10
chrysene	2.43E-06	4.00E-02	6.09E-05	3.48E-08	1.15E-01	4.00E-09
dibenz(a,h)anthracene	1.16E-06	4.00E-02	2.89E-05	1.65E-08	4.10E+00	6.78E-08
fluoranthene	1.51E-06	4.00E-01	3.77E-06	2.16E-08	NA	NA
indeno(1,2,3-cd)pyrene	1.89E-06	4.00E-02	4.72E-05	2.70E-08	1.15E+00	3.10E-08
naphthalene	1.75E-06	4.00E-02	4.36E-05	2.49E-08	NA	NA
n-butylbenzene	1.59E-08	1.00E-01	1.59E-07	2.28E-10	NA	NA
n-propylbenzene	1.46E-08	1.00E-01	1.46E-07	2.08E-10	NA	NA
p-cymene	1.40E-08	1.00E-01	1.40E-07	2.00E-10	NA	NA
phenanthrene	1.73E-06	3.00E-01	5.76E-06	2.47E-08	NA	NA
pyrene	2.66E-06	3.00E-01	8.85E-06	3.79E-08	NA	NA
tetrachloroethene	1.53E-08	1.00E-01	1.53E-07	2.18E-10	5.10E-02	1.11E-11
trichloroethene	1.49E-08	7.35E-03	2.03E-06	2.13E-10	1.50E-02	3.20E-12
xylenes	1.33E-08	2.00E+00	6.64E-09	1.90E-10	NA	NA
HQ Summation =			1.7E-02			
ILCR Summation =			8.2E-07			

Table B-4
Summary of Unit Risk Characterization
On-Site Construction Worker AOPC 1
Via Inhalation of Particulates and Volatiles

Intake Equation	=	CS X ((VF + PEF) X EX ED X ET X IR BW X AT)					
IR	Inhalation rate of gases (RAGS, 1989)	2.5 m³/h					
EF	Exposure frequency	250 days/year					
EDn	Exposure duration for non-carcinogens	1 year					
EDc	Exposure duration for carcinogens	1 year					
BW	Body weight	70 kg					
ATc	Average time for carcinogens (Lifetime)	25550 days					
ATn	Average time for non-carcinogens (EDn x 365)	365 days					
ET	Exposure time outdoors	8 h/d					
CS	Concentration of chemicals in soil	(see Table 5-1)					
VF	Volatilization Factor	(see Table 5-4)					
PEF	Particulate Emission Factor	(see Section 5.3.1.2)					
Chemical Concentrations							
Compound	VF (m³/kg)	PEF (m³/kg)	CS (mg/kg)	Compound	VF (m³/kg)	PEF (m³/kg)	CS (mg/kg)
1,1-dichloroethene	2.07E+01	NA	2.57E-03	naphthalene	NA	4.77E+09	2.05E-01
1,2,4-trimethylbenzene	1.79E+03	NA	3.82E-03	n-butylbenzene	1.26E+03	NA	2.81E-03
1,3,5-trimethylbenzene	8.99E+02	NA	2.96E-03	n-propylbenzene	7.29E+02	NA	2.57E-03
aroclor 1248	NA	4.77E+09	3.69E-02	p-cymene	2.94E+03	NA	2.47E-03
aroclor 1254	NA	4.77E+09	3.28E-02	phenanthrene	NA	4.77E+09	2.03E-01
aroclor 1260	NA	4.77E+09	2.08E-02	Pyrene	NA	4.77E+09	3.12E-01
arsenic	NA	4.77E+09	1.56E+00	terachloroethene	3.02E+02	NA	2.69E-03
benzo(a)anthracene	NA	4.77E+09	2.43E-01	trichloroethene	2.72E+02	NA	2.63E-03
benzo(a)pyrene	NA	4.77E+09	3.39E-01	xylenes	8.50E+02	NA	2.34E-03
benzo(b)fluoranthene	NA	4.77E+09	3.91E-01				
benzo(k)fluoranthene	NA	4.77E+09	3.06E-01				
bis(2-ethylhexyl)phthalate	NA	4.77E+09	2.58E-01				
chrysene	NA	4.77E+09	2.86E-01				
dibenz(a,h)anthracene	NA	4.77E+09	1.36E-01				
fluoranthene	NA	4.77E+09	2.66E-01				
indenof(1,2-3-cd)pyrene	NA	4.77E+09	3.33E-01				

Table B-4 (cont.)
Summary of Unit Risk Characterization
On-Site Construction Worker AOPC 1
Via Inhalation of Particulates and Volatiles

Compound	Non-Carcinogenic Calculation		
	CDI (mg/kg-d)	RFD (mg/kg-d)	HQ (unitless)
1,1-dichloroethene	2.43E-05	9.00E-03	2.70E-03
1,2,4-trimethylbenzene	4.18E-07	2.00E-03	2.09E-04
1,3,5-trimethylbenzene	6.44E-07	2.00E-03	3.22E-04
aroclor 1248	1.51E-12	7.00E-05	2.16E-08
aroclor 1254	1.34E-12	7.00E-05	1.92E-08
aroclor 1260	8.53E-13	7.00E-05	1.22E-08
arsenic	6.39E-11	3.00E-04	2.13E-07
benzo(a)anthracene	9.96E-12	4.00E-02	2.49E-10
benzo(a)pyrene	1.39E-11	4.00E-02	3.47E-10
benzo(b)fluoranthene	1.60E-11	4.00E-02	4.01E-10
benzo(k)fluoranthene	1.25E-11	4.00E-02	3.14E-10
bis(2-ethylhexyl)phthalate	1.06E-11	2.00E-02	5.29E-10
chrysene	1.17E-11	4.00E-02	2.93E-10
dibenzof(a,h)anthracene	5.57E-12	4.00E-02	1.39E-10
fluoranthene	1.09E-11	4.00E-01	2.73E-11
indeno[1,2,3-cd]pyrene	1.36E-11	4.00E-02	3.41E-10
naphthalene	8.40E-12	4.00E-02	2.10E-10
n-butylbenzene	4.38E-07	2.90E-01	1.51E-06
n-propylbenzene	6.90E-07	2.90E-01	2.38E-06
p-cymene	1.64E-07	1.00E-01	1.64E-06
phenanthrene	8.32E-12	3.00E-01	2.77E-11
pyrene	1.28E-11	3.00E-01	4.26E-11
tetrachloroethene	1.74E-06	1.00E-01	1.74E-05
trichloroethene	1.89E-06	7.35E-03	2.58E-04
xylenes	5.39E-07	2.00E-01	2.69E-06
HQ Summation =			3.5E-03

Compound	Carcinogenic Calculation			
	CDI (mg/kg-d)	CSF (mg/kg-d) ⁻¹	ICR (unitless)	
1,1-dichloroethene	3.47E-07	NA	NA	
1,2,4-trimethylbenzene	5.97E-09	NA	NA	
1,3,5-trimethylbenzene	9.21E-09	NA	NA	
aroclor 1248	2.16E-14	7.70E+00	1.66E-13	
aroclor 1254	1.92E-14	7.70E+00	1.48E-13	
aroclor 1260	1.22E-14	7.70E+00	9.38E-14	
arsenic	9.13E-13	1.20E+01	1.10E-11	
benzo(a)anthracene	1.42E-13	3.90E-01	5.55E-14	
benzo(a)pyrene	1.99E-13	3.90E+00	7.74E-13	
benzo(b)fluoranthene	2.29E-13	3.90E-01	8.93E-14	
benzo(k)fluoranthene	1.79E-13	3.90E-01	6.99E-14	
bis(2-ethylhexyl)phthalate	1.51E-13	8.40E-03	1.27E-15	
chrysene	1.67E-13	3.90E-02	6.53E-15	
dibenz(a,h)anthracene	7.96E-14	4.10E+00	3.27E-13	
fluoranthene	1.56E-13	NA	NA	
indeno(1,2,3-cd)pyrene	1.95E-13	3.90E-01	7.60E-14	
naphthalene	1.20E-13	NA	NA	
n-butylbenzene	6.26E-09	NA	NA	
n-propylbenzene	9.85E-09	NA	NA	
p-cymene	2.35E-09	NA	NA	
phenanthrene	1.19E-13	NA	NA	
pyrene	1.83E-13	NA	NA	
tetrachloroethene	2.49E-08	2.10E-02	5.22E-10	
trichloroethene	2.71E-08	1.00E-02	2.71E-10	
xylenes	7.70E-09	NA	NA	

Table B-5
Summary of Potential Health Effects
On-Site Construction Worker AOPC 2

<u>Exposure Pathway</u>	<u>Receptor Hazard Quotient</u>
Inhalation of Particulates and Volatiles	7.1E-03
Incidental ingestion of soils	3.5E-03
Dermal contact with soils	4.4E-03
Total Population Hazard Quotient =	1.5E-02

<u>Exposure Pathway</u>	<u>Receptor Incremental Lifetime Cancer Risk</u>
Inhalation of Particulates and Volatiles	1.8E-09
Incidental ingestion of soils	2.8E-07
Dermal contact with soils	4.8E-07
Total Population Incremental Lifetime Cancer Risk =	7.7E-07

Table B-6
Summary of Unit Risk Characterization
On-Site Construction Worker AOPC 2
Via Incidental Ingestion of Soils

Intake Equation	=	CS X EF X ED X CF X IR BW X AT	
IRs	Ingestion rate of soil (RAGS, 1989)	480 mg/day	
CF	Conversion factor	1.0E-06 kg/mg	
EF	Exposure frequency	250 d/year	
EDn	Exposure duration for non-carcinogens	1 year	
EDc	Exposure duration for carcinogens	1 year	
BW	Body weight	70 kg	
ATe	Average time for carcinogens (lifetime)	2550 day	
ATn	Average time for non-carcinogens (EDn x 365)	365 day	
CS	Concentration of chemicals in soil (see Table 5-1)		
Chemical Concentrations			
Compound	Concentration	Compound	Concentration
1,1-dichloroethene	4.05E-03	naphthalene	2.15E-01
1,2,4-trimethylbenzene	1.85E-02	n-butylbenzene	6.18E-03
1,3,5-trimethylbenzene	8.93E-03	n-propylbenzene	5.78E-03
arclor 1248	1.63E-02	p-cymene	6.45E-03
arclor 1254	1.63E-02	phenanthrene	
arclor 1260	1.72E-02	Pyrene	1.42E-01
arsenic	NA	tetrachloroethene	1.28E-01
benzo(a)anthracene	1.06E-01	trichloroethene	4.53E-03
benzo(a)pyrene	2.24E-01	xylenes	8.56E-03
benzo(b)fluoranthene	2.28E-01		6.45E-03
benzo(k)fluoranthene	2.05E-01		
bis(2-ethylhexyl)phthalate	1.03E-01		
chrysene	1.22E-01		
dibenzo(a,h)anthracene	8.54E-02		
fluoranthene	1.18E-01		
indeno(1,2,3-cd)pyrene	2.12E-01		

Table B-6 (cont.)
Summary of Unit Risk Characterization
On-Site Construction Worker AOPC 2
Via Incidental Ingestion of Soils

Non-Carcinogenic Calculation				Carcinogenic Calculation			
Compound	CDI (mg/kg-d)	RFD (mg/kg-d)	HQ (unitless)	Compound	CDI (mg/kg-d)	CSF (mg/kg-d) ⁻¹	ILCR (unitless)
1,1-dichloroethene	1.90E-08	9.00E-03	2.11E-06	1,1-dichloroethene	2.72E-10	NA	NA
1,2,4-trimethylbenzene	8.69E-08	5.00E-01	1.74E-07	1,2,4-trimethylbenzene	1.24E-09	NA	NA
1,3,5-trimethylbenzene	4.19E-08	5.00E-01	8.39E-08	1,3,5-trimethylbenzene	5.99E-10	NA	NA
aroclos 1248	7.66E-08	7.00E-05	1.09E-03	aroclos 1248	1.09E-09	7.70E+00	8.42E-09
aroclos 1254	7.66E-08	7.00E-05	1.09E-03	aroclos 1254	1.09E-09	7.70E+00	8.42E-09
aroclos 1260	8.08E-08	7.00E-05	1.15E-03	aroclos 1260	1.15E-09	7.70E+00	8.89E-09
arsenic	NA	3.00E-04	NA	arsenic	NA	1.50E+00	NA
benzo(a)anthracene	4.98E-07	4.00E-02	1.24E-05	benzo(a)anthracene	7.11E-09	1.15E+00	8.18E-09
benzo(a)pyrene	1.05E-06	4.00E-02	2.63E-05	benzo(a)pyrene	1.50E-08	1.15E+01	1.73E-07
benzo(b)fluoranthene	1.07E-06	4.00E-02	2.68E-05	benzo(b)fluoranthene	1.53E-08	1.15E+00	1.76E-08
benzo(k)fluoranthene	9.63E-07	4.00E-02	2.41E-05	benzo(k)fluoranthene	1.38E-08	1.15E+00	1.58E-08
bis(2-ethylhexyl)phthalate	4.84E-07	2.00E-02	2.42E-05	bis(2-ethylhexyl)phthalate	6.91E-09	8.40E-03	5.81E-11
chrysene	5.73E-07	4.00E-02	1.43E-05	chrysene	8.19E-09	1.15E-01	9.41E-10
dibenz(a,h)anthracene	4.01E-07	4.00E-02	1.00E-05	dibenz(a,h)anthracene	5.73E-09	4.10E+00	2.35E-08
fluoranthene	5.54E-07	4.00E-01	1.39E-06	fluoranthene	7.92E-09	NA	NA
indeno(1,2,3-cd)pyrene	9.96E-07	4.00E-02	2.49E-05	indeno(1,2,3-cd)pyrene	1.42E-08	1.15E+00	1.64E-08
naphthalene	1.01E-06	4.00E-02	2.52E-05	naphthalene	1.44E-08	NA	NA
n-butylbenzene	2.90E-08	1.00E-01	2.90E-07	n-butylbenzene	4.15E-10	NA	NA
n-propylbenzene	2.71E-08	1.00E-01	2.71E-07	n-propylbenzene	3.88E-10	NA	NA
p-cymene	3.03E-08	1.00E-01	3.03E-07	p-cymene	4.33E-10	NA	NA
phenanthrene	6.67E-07	3.00E-01	2.22E-06	phenanthrene	9.53E-09	NA	NA
pyrene	6.01E-07	3.00E-01	2.00E-06	pyrene	8.59E-09	NA	NA
tetrachloroethene	2.13E-08	1.00E-01	2.13E-07	tetrachloroethene	3.04E-10	5.10E-02	1.55E-11
trichloroethene	4.02E-08	7.35E-03	5.47E-06	trichloroethene	5.74E-10	1.50E-02	8.62E-12
xylenes	3.03E-08	2.00E+00	1.51E-08	xylenes	4.33E-10	NA	NA
HQ Summation =				ILCR Summation =			
				2.8E-07			

Table B-7
Summary of Unit Risk Characterization
On-Site Construction Worker AOPC 2
Via Dermal Contact with Soils

$$\text{Intake Equation} = \frac{\text{CS} \times \text{CF} \times \text{EF} \times \text{ED} \times \text{AF} \times \text{ABS} \times \text{SA}}{\text{BW} \times \text{AT}}$$

SA	Surface area of exposed skin (50th percentile, hands only)	5800 cm ² /day
AF	Adherence Factor	1 mg/cm ²
ABS	Absorption factor (see table below)	CSV
CF	Conversion factor	1.0E-06 kg/mg
EF	Exposure frequency	250 day/year
EDn	Exposure duration for non-carcinogens	1 year
EDc	Exposure duration for carcinogens	1 year
BW	Body weight	70 kg
ATc	Average time for carcinogens (lifetime)	2550 day
ATn	Average time for non-carcinogens (EDn x 365)	365 day
CS	Concentration of chemicals in soil (see Table 5-1)	

Chemical Concentrations

Compound	ABS (unitless)	Concentration (mg/kg)	Compound	ABS (unitless)	Concentration (mg/kg)
1,1-dichloroethene	1.00E-01	4.05E-03	naphthalene	1.50E-01	2.15E-01
1,2,4-trimethylbenzene	1.00E-01	1.85E-02	n-butylbenzene	1.00E-01	6.18E-03
1,3,5-trimethylbenzene	1.00E-01	8.93E-03	n-propylbenzene	1.00E-01	5.78E-03
aroclor 1248	1.00E-01	1.63E-02	p-cymene	1.00E-01	6.45E-03
aroclor 1254	1.00E-01	1.63E-02	phenanthrene	1.50E-01	1.42E-01
aroclor 1260	1.00E-01	1.72E-02	pyrene	1.50E-01	1.28E-01
arsenic	3.00E-02	NA	tetrachloroethylene	1.00E-01	4.53E-03
benzo(a)anthracene	1.50E-01	1.06E-01	trichloroethene	1.00E-01	8.56E-03
benzo(b)pyrene	1.50E-01	2.24E-01	xylenes	1.00E-01	6.45E-03
benzo(b)fluoranthene	1.50E-01	2.28E-01			
benzo(k)fluoranthene	1.50E-01	2.03E-01			
bis(2-ethylhexyl)phthalate	1.00E-01	1.03E-01			
chrysene	1.50E-01	1.22E-01			
dibenz(a,h)anthracene	1.50E-01	8.54E-02			
fluoranthene	1.00E-01	1.18E-01			
indeno(1,2,3-cd)pyrene	1.00E-01	2.12E-01			

Table B-7 (cont.)
Summary of Unit Risk Characterization
On-Site Construction Worker AOPC 2
Via Dermal Contact with Soils

Non-Carcinogenic Calculation				Carcinogenic Calculation			
Compound	CDI (mg/kg-d)	RfD (mg/kg-d)	HQ (unitless)	Compound	CDI (mg/kg-d)	CSF (mg/kg-d) ₋₁	ILCR (unitless)
1,1-dichloroethene	2.30E-08	9.00E-03	2.55E-06	1,1-dichloroethene	3.28E-10	NA	NA
1,2,4-trimethylbenzene	1.05E-07	5.00E-01	2.10E-07	1,2,4-trimethylbenzene	1.50E-09	NA	NA
1,3,5-trimethylbenzene	5.07E-08	5.00E-01	1.01E-07	1,3,5-trimethylbenzene	7.24E-10	NA	NA
aroclor 1248	9.25E-08	7.00E-05	1.32E-03	aroclor 1248	1.32E-09	7.70E+00	1.02E-08
aroclor 1254	9.25E-08	7.00E-05	1.32E-03	aroclor 1254	1.32E-09	7.70E+00	1.02E-08
aroclor 1260	9.76E-08	7.00E-05	1.39E-03	aroclor 1260	1.39E-09	7.70E+00	1.07E-08
arsenic	NA	3.00E-04	NA	arsenic	NA	1.50E+00	NA
benzo(a)anthracene	9.02E-07	4.00E-02	2.26E-05	benzo(a)anthracene	1.29E-08	1.15E+00	1.48E-08
benzo(a)pyrene	1.91E-06	4.00E-02	4.77E-05	benzo(a)pyrene	2.72E-08	1.15E+01	3.13E-07
benzo(b)fluoranthene	1.94E-06	4.00E-02	4.85E-05	benzo(b)fluoranthene	2.77E-08	1.15E+00	3.19E-08
benzo(k)fluoranthene	1.75E-06	4.00E-02	4.36E-05	benzo(k)fluoranthene	2.49E-08	1.15E+00	2.87E-08
bis(2-ethylhexyl)phthalate	5.85E-07	2.00E-02	2.92E-05	bis(2-ethylhexyl)phthalate	8.35E-09	8.40E-03	7.01E-11
chrysene	1.04E-06	4.00E-02	2.60E-05	chrysene	1.48E-08	1.15E-01	1.71E-09
dibenz(a,h)anthracene	7.27E-07	4.00E-02	1.82E-05	dibenz(a,h)anthracene	1.04E-08	4.10E+00	4.26E-08
fluoranthene	6.70E-07	4.00E-01	1.67E-06	fluoranthene	9.37E-09	NA	NA
indeno(1,2,3-cd)pyrene	1.20E-06	4.00E-02	3.01E-05	indeno(1,2,3-cd)pyrene	1.72E-08	1.15E+00	1.98E-08
naphthalene	1.83E-06	4.00E-02	4.58E-05	naphthalene	2.61E-08	NA	NA
n-butylbenzene	3.51E-08	1.00E-01	3.51E-07	n-butylbenzene	5.01E-10	NA	NA
n-propylbenzene	3.28E-08	1.00E-01	3.28E-07	n-propylbenzene	4.69E-10	NA	NA
p-cymene	3.66E-08	1.00E-01	3.66E-07	p-cymene	5.23E-10	NA	NA
phenanthrene	1.21E-06	3.00E-01	4.03E-06	phenanthrene	1.73E-08	NA	NA
pyrene	1.09E-06	3.00E-01	3.63E-06	pyrene	1.56E-08	NA	NA
tetrachloroethene	2.57E-08	1.00E-01	2.57E-07	tetrachloroethene	3.67E-10	5.10E-02	1.87E-11
trichloroethene	4.86E-08	7.35E-03	6.61E-06	trichloroethene	6.94E-10	1.50E-02	1.04E-11
xylenes	3.66E-08	2.00E+00	1.83E-08	xylenes	5.23E-10	NA	NA
HQ Summation =				ILCR Summation =			
4.4E-03				4.4E-07			

ILCR Summation = 4.8E-07

HO Summation = 4.4E-03

Table B-8
Summary of Unit Risk Characterization
On-Site Construction Worker AOPC 2
Via Inhalation of Particulates and Volatiles

Intake Equation	=	CS X (1/VF ± 1/PEF) X EFF X EDX ET X IR BW X AT		
IR	Inhalation rate of gases (RAGS, 1989)	2.5 m³/h		
EF	Exposure frequency	250 days/year		
EDn	Exposure duration for non-carcinogens	1 year		
EDc	Exposure duration for carcinogens	1 year		
BW	Body weight	70 kg		
ATc	Average time for carcinogens (lifetime)	23550 days		
ATn	Average time for non-carcinogens (EDn x 365)	365 days		
ET	Exposure time outdoors	8 h/d		
CS	Concentration of chemicals in soil	(see Table 5-1)		
VF	Volatilization Factor	(see Table 5-4)		
PEF	Particulate Emission Factor	(see Section 5.3.1.2)		
Chemical Concentrations				
Compound	VF (m³/kg)	PEF (m³/kg)	CS (mg/kg)	CS (mg/kg)
1,1-dichloroethene	2.07E+01	NA	4.05E-03	NA
1,2,4-trimethylbenzene	1.79E+03	NA	1.85E-02	4.77E+09
1,3,5-trimethylbenzene	8.99E+02	NA	8.93E-03	NA
aroclo 1248	NA	4.77E+09	1.63E-02	7.29E+02
aroclo 1254	NA	4.77E+09	1.63E-02	NA
aroclo 1260	NA	4.77E+09	1.72E-02	2.94E+03
arsenic	NA	4.77E+09	NA	NA
benzo(a)anthracene	NA	4.77E+09	1.06E-01	6.45E-03
benzo(a)pyrene	NA	4.77E+09	2.24E-01	NA
benzo(b)fluoranthene	NA	4.77E+09	2.28E-01	NA
benzo(k)fluoranthene	NA	4.77E+09	2.03E-01	NA
bis(2-ethylhexyl)phthalate	NA	4.77E+09	1.03E-01	4.77E+09
chrysene	NA	4.77E+09	1.22E-01	NA
dibenz(a,h)anthracene	NA	4.77E+09	8.54E-02	NA
fluoranthene	NA	4.77E+09	1.18E-01	4.77E+09
inden(1,2,3-cd)pyrene	NA	4.77E+09	2.12E-01	NA

Table B-8 (cont.)
Summary of Unit Risk Characterization
On-Site Construction Worker AOPC 2
Via Inhalation of Particulates and Volatiles

Non-Carcinogenic Calculation			Carcinogenic Calculation		
Compound	CDI (mg/kg-d)	RTD (mg/kg-d)	HQ (unitless)	CDI (mg/kg-d)	CSF (mg/kg-d) ⁻¹
1,1-dichloroethene	3.83E-05	9.00E-03	4.26E-03	5.48E-07	NA
1,2,4-trimethylbenzene	2.02E-06	2.00E-03	1.01E-03	2.89E-08	NA
1,3,5-trimethylbenzene	1.94E-06	2.00E-03	9.72E-04	2.78E-08	NA
aroclor 1248	6.68E-13	7.00E-05	9.54E-09	9.54E-15	7.70E+00
aroclor 1254	6.68E-13	7.00E-05	9.54E-09	9.54E-15	7.70E+00
aroclor 1260	7.05E-13	7.00E-05	1.01E-08	1.01E-14	7.70E+00
arsenic	NA	3.00E-04	NA	NA	1.20E+01
benzo(a)anthracene	4.34E-12	4.00E-02	1.09E-10	6.21E-14	3.90E-01
benzo(a)pyrene	9.18E-12	4.00E-02	2.30E-10	1.31E-13	3.90E+00
benzo(b)fluoranthene	9.35E-12	4.00E-02	2.34E-10	1.34E-13	3.90E-01
benzo(k)fluoranthene	8.40E-12	4.00E-02	2.10E-10	1.20E-13	3.90E-01
bis(2-ethylhexyl)phthalate	4.22E-12	2.00E-02	2.11E-10	6.03E-14	8.40E-03
chrysene	5.00E-12	4.00E-02	1.25E-10	7.14E-14	3.90E-02
dibenzo(a,h)anthracene	3.50E-12	4.00E-02	8.75E-11	5.00E-14	4.10E+00
fluoranthene	4.84E-12	4.00E-01	1.21E-11	6.91E-14	NA
indeno(1,2,3-cd)pyrene	8.69E-12	4.00E-02	2.17E-10	1.24E-13	3.90E-01
naphthalene	8.81E-12	4.00E-02	2.20E-10	1.26E-13	NA
n-butylbenzene	9.64E-07	2.90E-01	3.32E-06	1.38E-08	NA
n-propylbenzene	1.55E-06	2.90E-01	5.35E-06	2.22E-08	NA
p-cymene	4.29E-07	1.00E-01	4.29E-06	6.13E-09	NA
phenanthrene	5.82E-12	3.00E-01	1.94E-11	8.32E-14	NA
pyrene	5.25E-12	3.00E-01	1.75E-11	7.50E-14	NA
tetrachloroethene	2.93E-06	1.00E-01	2.93E-05	4.19E-08	2.10E-02
trichloroethene	6.16E-06	7.35E-03	8.39E-04	8.80E-08	1.00E-02
xylenes	1.49E-06	2.00E-01	7.43E-06	2.12E-08	NA
HQ Summation =			7.1E-03		

Compound	CDI (mg/kg-d)	CSF (mg/kg-d) ⁻¹	ILCR (unitless)
1,1-dichloroethene	4.26E-03	5.48E-07	NA
1,2,4-trimethylbenzene	1.01E-03	2.89E-08	NA
1,3,5-trimethylbenzene	9.72E-04	2.78E-08	NA
aroclor 1248	9.54E-09	9.54E-15	7.35E-14
aroclor 1254	9.54E-09	9.54E-15	7.35E-14
aroclor 1260	1.01E-08	1.01E-14	7.76E-14
arsenic	NA	NA	NA
benzo(a)anthracene	6.21E-14	3.90E-01	2.42E-14
benzo(a)pyrene	1.31E-13	3.90E+00	5.12E-13
benzo(b)fluoranthene	1.34E-13	3.90E-01	5.21E-14
benzo(k)fluoranthene	1.20E-13	3.90E-01	4.68E-14
bis(2-ethylhexyl)phthalate	6.03E-14	8.40E-03	5.07E-16
chrysene	7.14E-14	3.90E-02	2.79E-15
dibenzo(a,h)anthracene	5.00E-14	4.10E+00	2.05E-13
fluoranthene	6.91E-14	NA	NA
indeno(1,2,3-cd)pyrene	1.24E-13	3.90E-01	4.84E-14
naphthalene	1.26E-13	NA	NA
n-butylbenzene	1.38E-08	NA	NA
n-propylbenzene	2.22E-08	NA	NA
p-cymene	6.13E-09	NA	NA
phenanthrene	8.32E-14	NA	NA
pyrene	7.50E-14	NA	NA
tetrachloroethene	4.19E-08	2.10E-02	8.79E-10
trichloroethene	8.80E-08	1.00E-02	8.80E-10
xylenes	2.12E-08	NA	NA
ILCR Summation =		1.8E-09	

Table B-9
Summary of Potential Health Effects
On-Site Commercial/Industrial Worker AOPC 1

Exposure Pathway	Receptor Hazard Quotient
Inhalation of Indoor Air	6.4E-05
Total Population Hazard Quotient =	6.4E-05
Exposure Pathway	Receptor Incremental Lifetime Cancer Risk
Inhalation of Indoor Air	1.2E-10
Total Population Incremental Lifetime Cancer Risk =	1.2E-10

Table B-10
Summary of Risk Quantitation
On-Site Commercial/Industrial Worker AOPC 1
Via Inhalation of Indoor Air

Intake Equation	=	CS X EF X ED X ET X IR BW X AT	
IR	Inhalation rate of gases (RAGS, 1989)	0.83 mg/h	
EF	Exposure frequency	125 days/year	
EDn	Exposure duration for non-carcinogens	25 year	
EDc	Exposure duration for carcinogens	25 year	
BW	Body weight	70 kg	
ATc	Average time for carcinogens (lifetime)	2550 days	
ATn	Average time for non-carcinogens (EDn x 365)	9125 days	
ET	Exposure time indoors	8 h/d	
Ci	Concentration of chemicals indoors (indoor + outdoor)	(see Tables 5-6 and 5-7)	
Chemical Concentrations			
Compound	Concentration (mg/m ³)	Concentration (mg/m ³)	
1,1-dichloroethene	1.6E-05	naphthalene	NA
1,2,4-trimethylbenzene	2.80E-08	n-butylbenzene	1.97E-08
1,3,5-trimethylbenzene	5.58E-08	n-propylbenzene	6.01E-08
aroclor 1248	NA	p-cymene	3.54E-09
aroclor 1254	NA	phenanthrene	NA
aroclor 1260	NA	pyrene	NA
arsenic	NA	terachloroethylene	2.53E-07
benzo(a)anthracene	NA	trichloroethylene	5.45E-07
benzo(a)pyrene	NA	xylenes	3.82E-08
benzo(b)fluoranthene	NA		
benzo(k)fluoranthene	NA		
bis(2-ethylhexyl)phthalate	NA		
chrysene	NA		
dibenz(a,h)anthracene	NA		
fluoranthene	NA		
indenol(1,2,3-cd)pyrene	NA		

Table B-10 (cont.)
Summary of Risk Quantitation
On-Site Commercial/Industrial Worker AOPC 1
Via Inhalation of Indoor Air

Compound	Non-Carcinogenic Calculation			
	CDI (mg/kg-d)	RD (mg/kg-d)	HQ (unitless)	
1,1-dichloroethene	5.32E-07	9.00E-03	5.91E-05	
1,2,4-trimethylbenzene	9.09E-10	2.00E-03	4.54E-07	
1,3,5-trimethylbenzene	1.81E-09	2.00E-03	9.06E-07	
arcochlor 1248	NA	7.00E-05	NA	
arcochlor 1254	NA	7.00E-05	NA	
arcochlor 1260	NA	7.00E-05	NA	
arsenic	NA	3.00E-04	NA	
benzo(a)anthracene	NA	4.00E-02	NA	
benzo(a)pyrene	NA	4.00E-02	NA	
benzo(b)fluoranthene	NA	4.00E-02	NA	
benzeno(k)fluoranthene	NA	4.00E-02	NA	
bis(2-ethylhexyl)phthalate	NA	2.00E-02	NA	
chrysene	NA	4.00E-02	NA	
dibenzo(a,h)anthracene	NA	4.00E-02	NA	
fluoranthene	NA	4.00E-02	NA	
indeno(1,2,3-cd)pyrene	NA	4.00E-02	NA	
naphthalene	NA	4.00E-02	NA	
n-butylbenzene	6.40E-10	2.90E-01	2.21E-09	
n-propylbenzene	1.95E-09	2.90E-01	6.73E-09	
p-cymene	1.15E-10	1.00E-01	1.15E-09	
phenanthrene	NA	3.00E-01	NA	
pyrene	NA	3.00E-02	NA	
tetrachloroethene	8.21E-09	1.00E-02	8.21E-07	
trichloroethene	1.77E-08	7.35E-03	2.41E-06	
xylenes	1.24E-09	2.00E-01	6.20E-09	

Compound	Carcinogenic Calculation		
	CDI (mg/kg-d)	CSF (mg/kg-d) _i	ILCR (unitless)
1,1-dichloroethene	1.90E-07	NA	NA
1,2,4-trimethylbenzene	3.25E-10	NA	NA
1,3,5-trimethylbenzene	6.47E-10	NA	NA
aroclor 1248	NA	7.70E+00	NA
aroclor 1254	NA	7.70E+00	NA
aroclor 1260	NA	7.70E+00	NA
arsenic	NA	1.20E+01	NA
benzo(a)anthracene	NA	3.90E-01	NA
benzo(a)pyrene	NA	3.90E+00	NA
benzo(b)fluoranthene	NA	3.90E-01	NA
benzo(k)fluoranthene	NA	3.90E-01	NA
bis(2-ethylhexyl)phthalate	NA	8.40E-03	NA
chrysene	NA	3.90E-02	NA
dibenz(a,h)anthracene	NA	4.10E+00	NA
fluoranthene	NA	NA	NA
indenol(1,2,3-cd)pyrene	NA	3.90E-01	NA
naphthalene	NA	NA	NA
n-butylbenzene	2.28E-10	NA	NA
n-propylbenzene	6.97E-10	NA	NA
p-cymene	4.11E-11	NA	NA
phenanthrene	NA	NA	NA
pyrene	NA	NA	NA
tetrachloroethene	2.93E-09	2.10E-02	6.16E-11
trichloroethene	6.32E-09	1.00E-02	6.32E-11
xylenes	4.43E-10	NA	NA

WCD Summary

ILCR Summation = 1.2E-10

Table B-11
Summary of Potential Health Effects
On-Site Commercial/Industrial Worker AOPC 2

Exposure Pathway	Receptor Hazard Quotient
Inhalation of Indoor Air	8.7E-05
Total Population Hazard Quotient =	8.7E-05
Exposure Pathway	Receptor Incremental Lifetime Cancer Risk
Inhalation of Indoor Air	1.7E-10
Total Population Incremental Lifetime Cancer Risk =	1.7E-10

Table B-12
Summary of Risk Quantitation
On-Site Commercial/Industrial Worker AOPC 2
Via Inhalation of Indoor Air

Intake Equation	=	CS X EF X ED X ET X IR BW X AT
IR	Inhalation rate of gases (RAGS, 1989)	0.83 m ³ /h
EF	Exposure frequency	125 days/year
ED _n	Exposure duration for non-carcinogens	25 year
ED _c	Exposure duration for carcinogens	25 year
BW	Body weight	70 kg
AT _c	Average time for carcinogens (lifetime)	2550 days
AT _n	Average time for non-carcinogens (ED _n x 365)	9125 days
ET	Exposure time indoor	8 h/d
CI	Concentration of chemicals indoors (indoor + outdoor) (see Tables 5-6 and 5-7)	
Chemical Concentrations		
Compound	Concentration (mg/m ³)	Concentration (mg/m ³)
1,1-dichloroethene	2.23E-05	NA
1,2,4-trimethylbenzene	4.45E-08	2.53E-08
1,3,5-trimethylbenzene	7.97E-08	8.01E-08
aroclor 1248	NA	4.65E-09
aroclor 1254	NA	NA
aroclor 1260	NA	NA
arsenic	NA	2.90E-07
benzo(a)anthracene	NA	8.25E-07
benzo(a)pyrene	NA	3.01E-08
benzo(b)fluoranthene	NA	NA
benzo(k)fluoranthene	NA	NA
bis(2-ethylhexyl)phthalate	NA	NA
chrysene	NA	NA
dibenz(a,h)anthracene	NA	NA
fluoranthene	NA	NA
indeno(1,2,3-cd)pyrene	NA	NA

Table B-12 (cont.)
Summary of Risk Quantitation
On-Site Commercial/Industrial Worker AOPC 2
Via Inhalation of Indoor Air

Non-Carcinogenic Calculation		
Compound	CDI (mg/kg-d)	RID (mg/kg-d)
1,1-dichloroethene	7.24E-07	9.00E-03
1,2,4-trimethylbenzene	1.45E-09	2.00E-03
1,3,5-trimethylbenzene	2.59E-09	2.00E-03
aroclor 1248	NA	7.00E-05
aroclor 1254	NA	7.00E-05
aroclor 1260	NA	7.00E-05
arsenic	NA	3.00E-04
benzo(a)anthracene	NA	4.00E-02
benzo(a)pyrene	NA	4.00E-02
benzo(b)fluoranthene	NA	4.00E-02
benzo(k)fluoranthene	NA	4.00E-02
bis(2-ethylhexyl)phthalate	NA	2.00E-02
chrysene	NA	4.00E-02
dibenz(a,h)anthracene	NA	4.00E-02
fluoranthene	NA	4.00E-02
indeno(1,2,3-cd)pyrene	NA	4.00E-02
naphthalene	NA	4.00E-02
n-butylbenzene	8.22E-10	2.90E-01
n-propylbenzene	2.60E-09	2.90E-01
p-cymene	1.51E-10	1.00E-01
phenanthrene	NA	3.00E-01
pyrene	NA	3.00E-02
tetrachloroethene	9.42E-09	1.00E-02
trichloroethene	2.68E-08	7.35E-03
xylenes	9.77E-10	2.00E-01
HQ Summation =		8.7E-05

Compound	Carcinogenic Calculation		
	CDI (mg/kg-d)	CSF (mg/kg-d)-1	ILCR (unitless)
1,1-dichloroethene	8.05E-05	2.59E-07	NA
1,2,4-trimethylbenzene	7.23E-07	5.16E-10	NA
1,3,5-trimethylbenzene	1.29E-06	9.25E-10	NA
aroclor 1248	NA	7.70E+00	NA
aroclor 1254	NA	7.70E+00	NA
aroclor 1260	NA	7.70E+00	NA
arsenic	NA	1.20E+01	NA
benzo(a)anthracene	NA	3.90E-01	NA
benzo(a)pyrene	NA	3.90E+00	NA
benzo(b)fluoranthene	NA	3.90E-01	NA
benzo(k)fluoranthene	NA	3.90E-01	NA
bis(2-ethylhexyl)phthalate	NA	8.40E-03	NA
chrysene	NA	3.90E-02	NA
dibenz(a,h)anthracene	NA	4.10E+00	NA
fluoranthene	NA	NA	NA
indeno(1,2,3-cd)pyrene	NA	3.90E-01	NA
naphthalene	NA	NA	NA
n-butylbenzene	NA	2.94E-10	NA
n-propylbenzene	NA	9.29E-10	NA
p-cymene	NA	5.39E-11	NA
phenanthrene	NA	NA	NA
pyrene	NA	NA	NA
tetrachloroethene	NA	3.36E-09	7.07E-11
trichloroethene	NA	9.57E-09	9.57E-11
xylenes	NA	3.49E-10	NA
ILCR Summation =		1.7E-10	

Table B-13
Summary of Potential Health Effects
DTSC Commercial/Industrial Worker AOPC 1

<u>Exposure Pathway</u>	<u>Receptor Hazard Quotient</u>
Inhalation of Indoor Air	3.2E-05
Inhalation of Outdoor Air	2.4E-05
Incidental Ingestion of Soil	1.6E-03
Dermal Contact with Soil	2.9E-03
Total Population Hazard Quotient =	4.6E-03

<u>Exposure Pathway</u>	<u>Receptor Incremental Lifetime Cancer Risk</u>
Inhalation of Indoor Air	6.2E-11
Inhalation of Outdoor Air	7.3E-11
Incidental Ingestion of Soil	7.9E-07
Dermal Contact with Soil	3.6E-06
Total Population Incremental Lifetime Cancer Risk =	4.4E-06

Table B-14
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker AOPC 1
Via Incidental Ingestion of Soils

Intake Equation	=	CS X EF X ED X CEX J R BW X AT	
IRs	Ingestion rate of soil (RAGS, 1989)	50 mg/day	
CF	Conversion factor	1.0E-06 kg/mg	
EF	Exposure frequency	125 d/year	
EDn	Exposure duration for non-carcinogens	25 year	
EDc	Exposure duration for carcinogens	25 year	
BW	Body weight	70 kg	
ATc	Average time for carcinogens (lifetime)	25550 day	
ATn	Average time for non-carcinogens (EDn x 365)	9125 day	
CS	Concentration of chemicals in soil (see Table 5-1)		
Chemical Concentrations			
Compound	Concentration (mg/kg)	Concentration (mg/kg)	
1,1-dichloroethene	2.57E-03	naphthalene	2.05E-01
1,2,4-trimethylbenzene	3.82E-03	n-butylbenzene	2.81E-03
1,3,5-trimethylbenzene	2.96E-03	n-propylbenzene	2.57E-03
aerol 1248	3.69E-02	p-xylene	2.47E-03
aerol 1254	3.28E-02	phenanthrene	2.03E-01
aerol 1260	2.08E-02	pyrene	3.12E-01
arsenic	1.56E+00	tetrachloroethene	2.69E-03
benzo(a)anthracene	2.43E-01	trichloroethylene	2.63E-03
benzo(a)pyrene	3.39E-01	xylenes	2.34E-03
benzofluoranthene	3.9E-01		
benzo(b)fluoranthene	3.06E-01		
bis(2-ethylhexyl)phthalate	2.58E-01		
chrysene	2.86E-01		
dibenz(a,h)anthracene	1.36E-01		
fluoranthene	2.66E-01		
indeno(1,2,3-cd)pyrene	3.33E-01		

Table B-14 (cont.)
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker AOPC 1
Via Incidental Ingestion of Soils

Table B-15
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker AOPC 1
Via Dermal Contact with Soils

$$\text{Intake Equation} = \frac{\text{CS} \times \text{CF} \times \text{EF} \times \text{ED} \times \text{AF} \times \text{ABS} \times \text{SA}}{\text{BW} \times \text{AT}}$$

SA	Surface area of exposed skin (50th percentile, hands only)	2020 cm ² /day
AF	Adherence Factor	1 mg/cm ²
ABS	Absorption factor (see table below)	CSV
CF	Conversion factor	1.0E-06 kg/mg
EF	Exposure frequency	125 d/year
EDn	Exposure duration for non-carcinogens	25 year
EDc	Exposure duration for carcinogens	25 year
BW	Body weight	70 kg
ATc	Average time for carcinogens (lifetime)	25550 day
ATn	Average time for non-carcinogens (EDn x 365)	9125 day
CS	Concentration of chemicals in soil (see Table 5-1)	

Chemical Concentrations

Compound	ABS (unitless)	Concentration (mg/kg)	Compound	ABS (unitless)	Concentration (mg/kg)
1,1-dichloroethene	1.00E-01	2.57E-03	naphthalene	1.50E-01	2.05E-01
1,2,4-trimethylbenzene	1.00E-01	3.82E-03	n-butylbenzene	1.00E-01	2.81E-03
1,3,5-trimethylbenzene	1.00E-01	2.96E-03	n-propylbenzene	1.00E-01	2.57E-03
aeroclor 1248	1.00E-01	3.69E-02	p-cymene	1.00E-01	2.47E-03
aeroclor 1254	1.00E-01	3.28E-02	phenanthrene	1.50E-01	2.03E-01
aeroclor 1260	1.00E-01	2.08E-02	pyrene	1.50E-01	3.12E-01
arsenic	3.00E-02	1.56E+00	tetrachloroethylene	1.00E-01	2.69E-03
benzo(a)anthracene	1.50E-01	2.43E-01	trichloroethene	1.00E-01	2.63E-03
benzo(a)biphenyl	1.50E-01	3.39E-01	xylenes	1.00E-01	2.34E-03
benzo(b)fluoranthene	1.50E-01	3.91E-01			
benzo(a)fluoranthene	1.50E-01	3.06E-01			
bis(2-ethylhexyl)phthalate	1.00E-01	2.58E-01			
chrysene	1.50E-01	2.86E-01			
dibenz(a,h)anthracene	1.50E-01	1.36E-01			
fluoranthene	1.00E-01	2.66E-01			
indeno(1,2,3-cd)pyrene	1.00E-01	3.33E-01			

Table B-15 (cont.)
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker AOPC 1
Via Dermal Contact with Soils

Compound	Non-Carcinogenic Calculation			Carcinogenic Calculation			
	CDI (ng/kg-d)	RID (mg/kg-d)	UH (unitless)	Compound	CDI (mg/kg-d)	CSF (mg/kg-d)	UR (unitless)
1,1-dichloroethene	2.34E-09	9.00E-03	2.82E-07	1,1-dichloroethene	9.07E-10	NA	NA
1,2,4-trimethylbenzene	3.78E-09	5.00E-01	7.55E-09	1,2,4-trimethylbenzene	1.35E-09	NA	NA
1,3,5-trimethylbenzene	2.93E-09	5.00E-01	5.85E-09	1,3,5-trimethylbenzene	1.04E-09	NA	NA
arcofor 1248	3.65E-08	7.00E-05	5.21E-04	arcofor 1248	1.30E-08	7.70E-00	1.00E-07
arcofor 1254	3.24E-08	7.00E-05	4.63E-04	arcofor 1254	1.16E-08	7.70E-00	8.91E-08
arcofor 1260	2.06E-08	7.00E-05	2.94E-04	arcofor 1260	7.34E-09	7.70E-00	5.65E-08
arsenic	4.63E-07	3.00E-04	1.54E-03	arsenic	1.65E-07	1.50E+00	2.48E-07
benzo(a)anthracene	3.60E-07	4.00E-02	9.01E-06	benzo(a)anthracene	1.29E-07	1.15E+00	1.48E-07
benzo(a)pyrene	5.03E-07	4.00E-02	1.26E-05	benzo(a)pyrene	1.79E-07	1.15E+01	2.06E-06
benzo(b)fluoranthene	5.80E-07	4.00E-02	1.45E-05	benzo(b)fluoranthene	2.07E-07	1.15E+00	2.38E-07
benzo(k)fluoranthene	4.54E-07	4.00E-02	1.13E-05	benzo(k)fluoranthene	1.62E-07	1.15E+00	1.88E-07
bis(2-ethylhexyl)phthalate	2.55E-07	2.00E-02	1.27E-05	bis(2-ethylhexyl)phthalate	9.11E-08	8.40E-03	7.65E-10
chrysene	4.24E-07	4.00E-02	1.06E-05	chrysene	1.51E-07	1.15E+01	1.74E-08
dibenzo(a,h)anthracene	2.02E-07	4.00E-02	5.04E-06	dibenzo(a,h)anthracene	7.20E-08	4.10E+00	2.95E-07
fluoranthene	2.63E-07	4.00E-02	6.57E-06	fluoranthene	9.39E-08	NA	NA
indeno(1,2,3-cd)pyrene	3.29E-07	4.00E-02	8.23E-06	indeno(1,2,3-cd)pyrene	1.18E-07	1.15E+00	1.35E-07
naphthalene	3.04E-07	4.00E-02	7.60E-06	naphthalene	1.09E-07	NA	NA
n-butylbenzene	2.78E-09	1.00E-01	2.78E-08	n-butylbenzene	9.92E-10	NA	NA
n-propylbenzene	2.34E-09	1.00E-01	2.54E-08	n-propylbenzene	9.07E-10	NA	NA
p-cymene	2.44E-09	1.00E-01	2.44E-08	p-cymene	8.72E-10	NA	NA
phenanthrene	3.01E-07	3.00E-01	1.00E-06	phenanthrene	1.07E-07	NA	NA
pyrene	4.63E-07	3.00E-02	1.54E-05	pyrene	1.65E-07	NA	NA
tetrachloroethene	2.66E-09	1.00E-02	2.66E-07	tetrachloroethene	9.49E-10	5.10E-02	4.84E-11
trichloroethene	2.60E-09	7.35E-03	3.54E-07	trichloroethene	9.28E-10	1.50E-02	1.39E-11
xylenes	2.31E-09	2.00E+00	1.16E-09	xylenes	8.26E-10	NA	NA
HQ Summation =	2.9E-03			ILCR Summation =	3.6E-06		

Table B-16
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker AOPC 1
Via Inhalation of Indoor Air

Intake Equation	=	C _i X E _F X E _D X E _T X IR BW X AT
IR	Inhalation rate of gases (RAGS, 1989)	0.83 m ³ /h
E _F	Exposure frequency	125 days/year
E _{Dn}	Exposure duration for non-carcinogens	25 year
E _{Dc}	Exposure duration for carcinogens	25 year
BW	Body weight	70 kg
A _{Tc}	Average time for carcinogens (lifetime)	25550 days
A _{Tn}	Average time for non-carcinogens (E _{Dn} x 365)	9125 days
E _T	Exposure time indoor	4 h/d
C _i	Concentration of chemicals indoors (indoor + outdoor) (see Tables 5-6 and 5-7)	
Chemical Concentrations	Compound	Concentration (mg/m ³)
	Compound	Concentration (mg/m ³)
	naphthalene	NA
	n-butylbenzene	1.97E-08
	n-propylbenzene	6.01E-08
	p-cymene	3.54E-09
	phenanthrene	NA
	pyrene	NA
	tetrachloroethylene	2.53E-07
	trichloroethylene	5.43E-07
	xylenes	3.82E-08
	1,1-dichloroethene	1.64E-05
	1,2,4-trimethylbenzene	2.80E-08
	1,3,5-trimethylbenzene	5.58E-08
	aroclor 1248	NA
	aroclor 1254	NA
	aroclor 1260	NA
	arsenic	NA
	benzo(a)anthracene	NA
	benzo(a)pyrene	NA
	benzo(b)fluoranthene	NA
	benzo(k)fluoranthene	NA
	bis(2-ethylhexyl)phthalate	NA
	chrysene	NA
	dibenzo(a,h)anthracene	NA
	fluoranthene	NA
	indane(1,2,3-cd)pyrene	NA

Table B-16 (cont.)
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker AOPC 1
Via Inhalation of Indoor Air

Non-Carcinogenic Calculation		
Compound	CDI (mg/kg-d)	RfD (mg/kg-d)
	HQ	(unitless)
1,1-dichloroethene	2.66E-07	9.000E-03
1,2,4-trimethylbenzene	4.54E-10	2.00E-03
1,3,5-trimethylbenzene	9.06E-10	2.00E-03
aroclor 1248	NA	7.00E-05
aroclor 1254	NA	7.00E-05
aroclor 1260	NA	7.00E-05
arsenic	NA	3.00E-04
benzo(a)anthracene	NA	4.00E-02
benzo(a)pyrene	NA	4.00E-02
benzo(b)fluoranthene	NA	4.00E-02
benzo(k)fluoranthene	NA	4.00E-02
bis(2-ethylhexyl)phthalate	NA	2.00E-02
chrysene	NA	4.00E-02
dibenz(a,h)anthracene	NA	4.00E-02
fluoranthene	NA	4.00E-02
indeno(1,2,3-cd)pyrene	NA	4.00E-02
naphthalene	NA	4.00E-02
n-butylbenzene	3.20E-10	2.90E-01
n-propylbenzene	9.76E-10	2.90E-01
p-cymene	5.75E-11	1.00E-01
phenanthrene	NA	3.00E-01
pyrene	NA	3.00E-02
tetrachloroethene	4.11E-09	1.00E-02
trichloroethene	8.85E-09	7.35E-03
xylenes	6.20E-10	2.00E-01
HQ Summation =		
3.2E-05		

Carcinogenic Calculation		
Compound	CDI (mg/kg-d)	CSF (mg/kg-d)-1
	ILCR	(unitless)
1,1-dichloroethene	9.50E-08	NA
1,2,4-trimethylbenzene	1.62E-10	NA
1,3,5-trimethylbenzene	3.24E-10	NA
aroclor 1248	NA	7.70E+00
aroclor 1254	NA	7.70E+00
aroclor 1260	NA	7.70E+00
arsenic	NA	1.20E+01
benzo(a)anthracene	NA	3.90E-01
benzo(a)pyrene	NA	3.90E+00
benzo(b)fluoranthene	NA	3.90E-01
benzo(k)fluoranthene	NA	3.90E-01
bis(2-ethylhexyl)phthalate	NA	8.40E-03
chrysene	NA	3.90E-02
dibenz(a,h)anthracene	NA	4.10E+00
fluoranthene	NA	NA
indeno(1,2,3-cd)pyrene	NA	3.90E-01
naphthalene	NA	NA
n-butylbenzene	NA	1.14E-10
n-propylbenzene	NA	3.49E-10
p-cymene	NA	2.05E-11
phenanthrene	NA	NA
pyrene	NA	NA
tetrachloroethene	NA	1.47E-09
trichloroethene	NA	2.10E-02
xylenes	NA	3.08E-11
ILCR Summation =		
6.2E-11		

Table B-17
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker AOPC 1
Via Inhalation of Outdoor Air

Intake Equation	=	(Ci+(Cs X 1/PEF)) X EF X ED X ET X IR BW X AT					
IR	Inhalation rate of gases (RAGS, 1989)	0.83 m³/h					
EF	Exposure frequency	125 days/year					
EDn	Exposure duration for non-carcinogens	25 year					
EDc	Exposure duration for carcinogens	25 year					
BW	Body weight	70 kg					
ATc	Average time for carcinogens (lifetime)	25550 days					
ATn	Average time for non-carcinogens (EDn x 365)	9125 days					
ET	Exposure time outdoor	4 h/d					
Ci	Concentration of volatiles in ambient air	(see Table 5-6) (see Section 5.3.1.2)					
PEF	Particulate Emission Factor (see Table below)						
Chemical Concentrations							
Compound	Soil Conc (mg/kg) (m³/kg)	PEF Concentration (mg/m³)	Volatile Concentration (mg/m³)	Compound	Soil Conc (mg/kg)	PEF Concentration (mg/m³)	Volatile Concentration (mg/m³)
1,1-dichloroethene	2.57E-03	NA	1.24E-05	naphthalene	2.05E-01	4.77E+09	NA
1,2,4-trimethylbenzene	3.82E-03	NA	2.38E-08	n-butylbenzene	2.81E-03	NA	1.43E-08
1,3,5-trimethylbenzene	2.96E-03	NA	4.37E-08	n-propylbenzene	2.57E-03	NA	4.48E-08
aroclor 1248	3.69E-02	4.77E-09	NA	p-cymene	2.47E-03	NA	
aroclor 1254	3.28E-02	4.77E-09	NA	phenanthrene	2.03E-01	4.77E+09	2.61E-09
aroclor 1260	2.08E-02	4.77E-09	NA	pyrene	3.12E-01	4.77E+09	NA
arsenic	1.56E+00	4.77E-09	NA	tetrachloroethene	2.69E-03	NA	1.70E-07
benzo(a)anthracene	2.43E-01	4.77E-09	NA	trichloroethene	2.63E-03	NA	4.46E-07
benzo(a)pyrene	3.39E-01	4.77E-09	NA	xylenes	2.34E-03	NA	2.79E-08
benzo(b)fluoranthene	3.91E-01	4.77E-09	NA				
benzo(k)fluoranthene	3.06E-01	4.77E-09	NA				
bis(2-ethylhexyl)phthalate	2.58E-01	4.77E-09	NA				
chrysene	2.86E-01	4.77E-09	NA				
dibenz(a,h)anthracene	1.36E-01	4.77E-09	NA				
fluoranthene	2.66E-01	4.77E-09	NA				
indeno(1,2,3-cd)pyrene	3.33E-01	4.77E-09	NA				

Table B-I7 (cont.)
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker AOPC 1
Via Inhalation of Outdoor Air

Non-Carcinogenic Calculation			Carcinogenic Calculation		
Compound	CDI (mg/kg-d)	RfD (mg/kg-d)	HQ (unitless)	CDI (mg/kg-d)	CSF (mg/kg-d) ₋₁
1,1-dichloroethene	2.01E-07	9.00E-03	2.24E-05	7.19E-08	NA
1,2,4-trimethylbenzene	3.87E-10	2.00E-03	1.93E-07	1.38E-10	NA
1,3,5-trimethylbenzene	7.10E-10	2.00E-03	3.55E-07	2.54E-10	NA
aroclor 1248	1.26E-13	7.00E-05	1.79E-09	4.48E-14	7.70E+00
aroclor 1254	1.12E-13	7.00E-05	1.59E-09	3.99E-14	7.70E+00
aroclor 1260	7.08E-14	7.00E-05	1.01E-09	2.53E-14	7.70E+00
arsenic	5.31E-12	3.00E-04	1.77E-08	1.90E-12	1.20E+01
benzo(a)anthracene	8.27E-13	4.00E-02	2.07E-11	2.95E-13	3.90E-01
benzo(a)pyrene	1.15E-12	4.00E-02	2.88E-11	4.12E-13	3.90E+00
benzo(b)fluoranthene	1.33E-12	4.00E-02	3.33E-11	4.75E-13	3.90E-01
benzo(k)fluoranthene	1.04E-12	4.00E-02	2.60E-11	3.72E-13	3.90E-01
bis(2-ethylhexyl)phthalate	8.78E-13	2.00E-02	4.39E-11	3.13E-13	8.40E-03
chrysene	9.73E-13	4.00E-02	2.43E-11	3.48E-13	3.90E-02
dibenzo(a,h)anthracene	4.63E-13	4.00E-02	1.16E-11	1.65E-13	4.10E+00
fluoranthene	9.05E-13	4.00E-02	2.26E-11	3.23E-13	NA
indeno(1,2,3-cd)pyrene	1.13E-12	4.00E-02	2.83E-11	4.05E-13	3.90E-01
naphthalene	6.97E-13	4.00E-02	1.74E-11	2.49E-13	NA
n-butylbenzene	2.32E-10	2.90E-01	8.01E-10	8.30E-11	NA
n-propylbenzene	7.28E-10	2.90E-01	2.51E-09	2.60E-10	NA
p-cymene	4.24E-11	1.00E-01	4.24E-10	1.51E-11	NA
phenanthrene	6.91E-13	3.00E-01	2.30E-12	2.47E-13	NA
pyrene	1.06E-12	3.00E-02	3.54E-11	3.79E-13	NA
tetrachloroethene	2.76E-09	1.00E-02	2.76E-07	9.86E-10	2.10E-02
trichloroethene	7.24E-09	7.35E-03	9.86E-07	2.59E-09	2.07E-11
xylenes	4.53E-10	2.00E-01	2.27E-09	1.62E-10	NA
HQ Summation =			2.4E-05		

ILCR Summation = **7.3E-11**

Table B-18
Summary of Potential Health Effects
DTSC Commercial/Industrial Worker AOPC 2

Exposure Pathway	Receptor Hazard Quotient
Inhalation of Indoor Air	4.4E-05
Inhalation of Outdoor Air	2.4E-05
Incidental Ingestion of Soil	1.9E-04
Dermal Contact with Soil	7.7E-04
Total Population Hazard Quotient =	1.0E-03

Exposure Pathway	Receptor Incremental Lifetime Cancer Risk
Inhalation of Indoor Air	8.3E-11
Inhalation of Outdoor Air	4.9E-11
Incidental Ingestion of Soil	3.7E-07
Dermal Contact with Soil	2.1E-06
Total Population Incremental Lifetime Cancer Risk =	2.5E-06

Table B-19
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker A OPC 2
Via Incidental Ingestion of Soils

Intake Equation	=	CS X EF X ED X CFX IR BW X AT	
IRs	Ingestion rate of soil (RAGS, 1989)	50 mg/day	
CF	Conversion factor	1.0E-06 kg/mg	
EF	Exposure frequency	125 dyear	
EDn	Exposure duration for non-carcinogens	25 year	
EDc	Exposure duration for carcinogens	25 year	
BW	Body weight	70 kg	
ATc	Average time for carcinogens (lifetime)	25560 day	
ATn	Average time for non-carcinogens (EDn x 365)	9125 day	
CS	Concentration of chemicals in soil (see Table 5-1)		
Chemical Concentrations			
Compound	Concentration (mg/kg)	Compound	Concentration (mg/kg)
1,1-dichloroethene	4.05E-03	naphthalene	2.15E-01
1,2,4-trimethylbenzene	1.82E-02	n-butylbenzene	6.18E-03
1,3,5-trimethylbenzene	8.92E-03	n-propylbenzene	5.78E-03
aroclor 1248	1.63E-02	p-cymene	6.49E-03
aroclor 1254	1.63E-02	phenanthrene	1.42E-01
aroclor 1260	1.72E-02	pyrene	1.28E-01
arsenic		tetrachloroethene	4.53E-03
benzo(a)anthracene	1.06E-01	trichloroethene	8.56E-03
benzo(a)pyrene	2.24E-01	xylenes	6.43E-03
benzo(b)fluoranthene	2.23E-01		
benzo(k)fluoranthene	2.03E-01		
bis(2-ethylhexyl)phthalate	1.03E-01		
chrysene	1.22E-01		
dibenzo(a,h)anthracene	8.54E-02		
fluoranthene	1.18E-01		
indeno(1,2,3-cd)pyrene	2.12E-01		

Table B-19 (cont.)
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker AOPC 2
Via Incidental Ingestion of Soils

Compound	Non-Carcinogenic Calculation			Carcinogenic Calculation		
	CDI (mg/kg-d)	RD (mg/kg-d)	UH (unitless)	Compound	CDI (mg/kg-d)	CSF (mg/kg-d) ¹
1,1-dichloroethene	9.91E-10	9.00E-03	1.10E-07	1,1-dichloroethene	3.54E-10	NA
1,2,4-trimethylbenzene	4.53E-09	5.00E-01	9.05E-09	1,2,4-trimethylbenzene	1.62E-09	NA
1,3,5-trimethylbenzene	2.18E-09	5.00E-01	4.37E-09	1,3,5-trimethylbenzene	7.80E-10	NA
aroclor 1248	3.99E-09	7.00E-05	5.70E-05	aroclor 1248	1.42E-09	7.70E+00
aroclor 1254	3.99E-09	7.00E-05	5.70E-05	aroclor 1254	1.42E-09	7.70E+00
aroclor 1260	4.21E-09	7.00E-05	6.01E-05	aroclor 1260	1.50E-09	7.70E+00
arsenic	NA	3.00E-04	NA	arsenic	NA	1.50E+00
benzo(a)anthracene	2.59E-08	6.48E-02	6.48E-07	benzo(a)anthracene	9.26E-09	1.06E-08
benzo(a)pyrene	5.48E-08	4.00E-02	1.37E-06	benzo(a)pyrene	1.96E-08	1.15E+01
benzo(b)fluoranthene	5.58E-08	4.00E-02	1.39E-06	benzo(b)fluoranthene	1.99E-08	1.15E+00
benzo(k)fluoranthene	5.01E-08	4.00E-02	1.25E-06	benzo(k)fluoranthene	1.79E-08	1.15E+00
bis(2-ethylhexyl)phthalate	2.52E-08	2.00E-02	1.26E-06	bis(2-ethylhexyl)phthalate	9.00E-09	8.40E-03
chrysene	2.98E-08	4.00E-02	7.46E-07	chrysene	1.07E-08	1.15E-01
dibenz(a,h)anthracene	2.09E-08	4.00E-02	5.22E-07	dibenz(a,h)anthracene	7.46E-09	4.10E+00
fluoranthene	2.89E-08	4.00E-02	7.22E-07	fluoranthene	1.03E-08	NA
indeno[1,2,3-cd]pyrene	5.19E-08	4.00E-02	1.30E-06	indeno[1,2,3-cd]pyrene	1.85E-08	1.15E+00
naphthalene	5.26E-08	4.00E-02	1.31E-06	naphthalene	1.88E-08	NA
n-butylbenzene	1.51E-09	1.00E-01	1.51E-08	n-butylbenzene	5.40E-10	NA
n-propylbenzene	1.41E-09	1.00E-01	1.41E-08	n-propylbenzene	5.05E-10	NA
p-cymene	1.58E-09	1.00E-01	1.38E-08	p-cymene	5.63E-10	NA
phenanthrene	3.47E-08	3.00E-01	1.16E-07	phenanthrene	1.24E-08	NA
pyrene	3.13E-08	3.00E-02	1.04E-06	pyrene	1.12E-08	NA
tetrachloroethene	1.11E-09	1.00E-02	1.11E-07	tetrachloroethene	3.96E-10	5.10E-02
trichloroethene	2.09E-09	7.35E-03	2.88E-07	trichloroethene	7.48E-10	1.50E-02
xylenes	1.58E-09	2.00E+00	7.89E-10	xylenes	5.63E-10	NA
HQ Summation =			1.9E-04	ILCR Summation =		3.7E-07

Table B-20
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker A OPC 2
Via Dermal Contact with Soils

Intake Equation = CS X CFX EFX ED X AFX ABS X SA.
 BW X AT

SA	Surface area of exposed skin (50th percentile, hands only)	2020 cm ² /day
AF	Adherence Factor	1 mg/cm ²
ABS	Absorption factor (see table below)	CSV
CF	Conversion factor	1.0E-06 kg/mg
EF	Exposure frequency	125 d/year
EDn	Exposure duration for non-carcinogens	25 year
EDc	Exposure duration for carcinogens	25 year
BW	Body weight	70 kg
ATc	Average time for carcinogens (lifetime)	25550 day
ATn	Average time for non-carcinogens (EDn x 365)	9125 day
CS	Concentration of chemicals in soil (see Table 5-1)	

Chemical Concentrations

Compound	ABS (unitless)	Concentration (mg/kg)	Compound	ABS (unitless)	Concentration (mg/kg)
1,1-dichloroethene	1.00E-01	4.05E-03	naphthalene	1.50E-01	2.15E-01
1,2,4-trimethylbenzene	1.00E-01	1.84E-02	n-butylbenzene	1.00E-01	6.18E-03
1,3,5-trimethylbenzene	1.00E-01	8.93E-03	n-propylbenzene	1.00E-01	5.78E-03
aroclor 1248	1.00E-01	1.63E-02	p-cymene	1.00E-01	6.45E-03
aroclor 1254	1.00E-01	1.63E-02	phenanthrene	1.50E-01	1.42E-01
aroclor 1260	1.00E-01	1.72E-02	pyrene	1.50E-01	1.28E-01
arsenic	3.00E-02	NA	tetrachloroethene	1.00E-01	4.53E-03
benzo(a)anthracene	1.50E-01	1.06E-01	trichloroethene	1.00E-01	8.56E-03
benzo(a)pyrene	1.50E-01	2.24E-01	xylenes	1.00E-01	6.45E-03
benzo(b)fluoranthene	1.50E-01	2.28E-01			
benzo(k)fluoranthene	1.50E-01	2.05E-01			
bis(2-ethylhexyl)phthalate	1.00E-01	1.03E-01			
chrysene	1.50E-01	1.22E-01			
dibenz(a,h)anthracene	1.50E-01	8.54E-02			
fluoranthene	1.00E-01	1.18E-01			
indeno[1,2,3-cd]pyrene	1.00E-01	2.12E-01			

Table B-20 (cont.)
Summary of Risk Quantitation
D1SC On-Site Commercial/Industrial Worker AOPC 2
Via Dermal Contact with Soils

Non-Carcinogenic Calculation				Carcinogenic Calculation			
Compound	CDI (mg/kg-d)	RID (mg/kg-d)	UH (unitless)	CDI (mg/kg-d)	CSF (mg/kg-d)	CSF (mg/kg-d)	UR (unitless)
1,1-dichloroethene	4.00E-09	9.00E-03	4.45E-07	1,1-dichloroethene	1.43E-09	NA	NA
1,2,4-trimethylbenzene	1.83E-08	5.00E-01	3.66E-08	1,2,4-trimethylbenzene	6.51E-09	NA	NA
1,3,5-trimethylbenzene	8.83E-09	5.00E-01	1.77E-08	1,3,5-trimethylbenzene	3.15E-09	NA	NA
arclor 1248	1.61E-08	7.00E-05	2.30E-04	arclor 1248	5.75E-09	7.70E+00	4.43E-08
arclor 1254	1.61E-08	7.00E-05	2.30E-04	arclor 1254	5.75E-09	7.70E+00	4.43E-08
arclor 1260	1.70E-08	7.00E-05	2.43E-04	arclor 1260	6.07E-09	7.70E+00	4.67E-08
arsenic	NA	3.00E-04	NA	arsenic	1.50E+00	NA	NA
benzo(a)anthracene	1.57E-07	4.00E-02	3.93E-06	benzo(a)anthracene	5.61E-08	1.15E+00	6.45E-08
benzo(a)pyrene	3.32E-07	4.00E-02	8.30E-06	benzo(a)pyrene	1.19E-07	1.15E+01	1.36E-06
benzo(b)fluoranthene	3.38E-07	4.00E-02	8.45E-06	benzo(b)fluoranthene	1.21E-07	1.15E+00	1.39E-07
benzo(k)fluoranthene	3.04E-07	4.00E-02	7.60E-06	benzo(k)fluoranthene	1.09E-07	1.15E+00	1.25E-07
bis(2-ethylhexyl)phthalate	1.02E-07	2.00E-02	5.09E-06	bis(2-ethylhexyl)phthalate	3.64E-08	8.40E-03	3.05E-10
chrysene	1.81E-07	4.00E-02	4.52E-06	chrysene	6.46E-08	1.15E-01	7.33E-09
dibenz(a,h)anthracene	1.27E-07	4.00E-02	3.16E-06	dibenz(a,h)anthracene	4.52E-08	4.10E+00	1.85E-07
fluoranthene	1.17E-07	4.00E-02	2.92E-06	fluoranthene	4.16E-08	NA	NA
indeno[1,2,3-cd]pyrene	2.10E-07	4.00E-02	5.24E-06	indeno[1,2,3-cd]pyrene	7.48E-08	1.15E+00	8.60E-08
naphthalene	3.19E-07	4.00E-02	7.97E-06	naphthalene	1.14E-07	NA	NA
n-butylbenzene	6.11E-09	1.00E-01	6.11E-08	n-butylbenzene	2.18E-09	NA	NA
n-propylbenzene	5.71E-09	1.00E-01	5.71E-08	n-propylbenzene	2.04E-09	NA	NA
p-cymene	6.37E-09	1.00E-01	6.37E-08	p-cymene	2.28E-09	NA	NA
phenanthrene	2.10E-07	3.00E-01	7.02E-07	phenanthrene	7.52E-08	NA	NA
pyrene	1.90E-07	3.00E-02	6.32E-06	pyrene	6.78E-08	NA	NA
tetrachloroethene	4.48E-09	1.00E-02	4.48E-07	tetrachloroethene	1.60E-09	5.10E-02	8.15E-11
trichloroethene	8.46E-09	7.35E-03	1.15E-06	trichloroethene	3.90E-09	1.50E-02	4.53E-11
xylenes	6.37E-09	2.00E-00	3.19E-09	xylenes	2.28E-09	NA	NA
HQ Summation =			7.7E-04	HQ Summation =			2.1E-06

Table B-21
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker A OPC 2
Via Inhalation of Indoor Air

Intake Equation	=	C _i × E _F × E _D × E _T × IR BW × AT	
IR	Inhalation rate of gases (RAGS, 1989)	0.83 m ³ /h	
E _F	Exposure frequency	125 days/year	
E _{Dn}	Exposure duration for non-carcinogens	25 year	
E _{Dc}	Exposure duration for carcinogens	25 year	
BW	Body weight	70 kg	
A _{Tc}	Average time for carcinogens (lifetime)	25550 days	
A _{Th}	Average time for non-carcinogens (E _{Dn} x 365)	9125 days	
E _T	Exposure time indoor	4 h/d	
C _i	Concentration of chemicals indoors (indoor + outdoor) (see Tables 5-6 and 5-7)		
Chemical Concentrations			
Compound	Concentration (mg/m ³)	Compound	Concentration (mg/m ³)
1,1-dichloroethene	2.2E-05	naphthalene	NA
1,2,4-trimethylbenzene	4.4E-08	n-butylbenzene	2.51E-08
1,3,5-trimethylbenzene	7.9E-08	n-propylbenzene	8.01E-08
aroclor 1248	NA	p-cymene	4.65E-09
aroclor 1254	NA	phenanthrene	NA
aroclor 1260	NA	pyrene	NA
arsenic	NA	tetrachloroethylene	2.90E-07
benzo(a)anthracene	NA	trichloroethylene	8.23E-07
benzo(a)pyrene	NA	xylenes	3.01E-08
benzo(b)fluoranthene	NA		
benzo(k)fluoranthene	NA		
bis(2-ethylhexyl)phthalate	NA		
chrysene	NA		
dibenz(a,h)anthracene	NA		
fluoranthene	NA		
indenof(1,2,3-cd)pyrene	NA		

Table B-21 (cont.)
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker AOPC 2
Via Inhalation of Indoor Air

Non-Carcinogenic Calculation			
Compound	CDI (mg/kg-d)	RFD (mg/kg-d)	HQ (unitless)
1,1-dichloroethene	3.62E-07	9.00E-03	4.02E-05
1,2,4-trimethylbenzene	7.23E-10	2.00E-03	3.61E-07
1,3,5-trimethylbenzene	1.29E-09	2.00E-03	6.47E-07
aeroclor 1248	NA	7.00E-05	NA
aeroclor 1254	NA	7.00E-05	NA
aeroclor 1260	NA	7.00E-05	NA
arsenic	NA	3.00E-04	NA
benzo(a)anthracene	NA	4.00E-02	NA
benzo(a)pyrene	NA	4.00E-02	NA
benzo(b)fluoranthene	NA	4.00E-02	NA
benzo(k)fluoranthene	NA	4.00E-02	NA
bis(2-ethylhexyl)phthalate	NA	2.00E-02	NA
chrysene	NA	4.00E-02	NA
dibenz(a,h)anthracene	NA	4.00E-02	NA
fluoranthene	NA	4.00E-02	NA
indeno(1,2,3-cd)pyrene	NA	4.00E-02	NA
naphthalene	NA	4.00E-02	NA
n-butylbenzene	4.11E-10	2.90E-01	1.42E-09
n-propylbenzene	1.30E-09	2.90E-01	4.49E-09
p-cymene	7.55E-11	1.00E-01	7.55E-10
phenanthrene	NA	3.00E-01	NA
pyrene	NA	3.00E-02	NA
tetrachloroethene	4.71E-09	1.00E-02	4.71E-07
trichloroethene	1.34E-08	7.35E-03	1.82E-06
xylenes	4.88E-10	2.00E-01	2.44E-09
HQ Summation =			4.4E-05

Carcinogenic Calculation			
Compound	CDI (mg/kg-d)	CSF (mg/kg-d) ⁻¹	ILCR (unitless)
1,1-dichloroethene	NA	1.29E-07	NA
1,2,4-trimethylbenzene	NA	2.58E-10	NA
1,3,5-trimethylbenzene	NA	4.62E-10	NA
aeroclor 1248	NA	7.70E+00	NA
aeroclor 1254	NA	7.70E+00	NA
aeroclor 1260	NA	7.70E+00	NA
arsenic	NA	1.20E+01	NA
benzo(a)anthracene	NA	3.90E-01	NA
benzo(a)pyrene	NA	3.90E+00	NA
benzo(b)fluoranthene	NA	3.90E-01	NA
benzo(k)fluoranthene	NA	3.90E-01	NA
bis(2-ethylhexyl)phthalate	NA	8.40E-03	NA
chrysene	NA	3.90E-02	NA
dibenz(a,h)anthracene	NA	4.10E+00	NA
fluoranthene	NA	NA	NA
indeno(1,2,3-cd)pyrene	NA	3.90E-01	NA
naphthalene	NA	NA	NA
n-butylbenzene	NA	1.47E-10	NA
n-propylbenzene	NA	4.65E-10	NA
p-cymene	NA	2.70E-11	NA
phenanthrene	NA	NA	NA
pyrene	NA	NA	NA
tetrachloroethene	NA	1.68E-09	2.10E-02
trichloroethene	NA	4.79E-09	1.00E-02
xylenes	NA	1.74E-10	NA
ILCR Summation =			8.3E-11

Table B-22
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker AOPC-2
Via Inhalation of Outdoor Air

Intake Equation	(Ci + (Cs X IPFF)) X EF X ED X ET X IR BW X AT							
Chemical Concentrations	Compound	Conc (mg/kg)	PEF	Soil	Conc (mg/kg)	PEF	Volatile	Concentration (mg/m ³)
IR	Inhalation rate of gases (RAGS, 1989)							
EF	Exposure frequency	0.83 m ³ /h						
EDn	Exposure duration for non-carcinogens							
EDc	Exposure duration for carcinogens	125 days/year						
BW	Body weight	25 year						
ATc	Average time for carcinogens (lifetime)	25 year						
ATn	Average time for non-carcinogens (EDn x 365)	70 kg						
ET	Exposure time outdoor	25550 days						
Ci	Concentration of chemicals outdoors	9125 days						
PEF	Particulate Emission Factor	4 h/d						
		(see Table 5-6)						
		(see Section 5.3.1.2)						

Table B-22 (cont.)
Summary of Risk Quantitation
DTSC On-Site Commercial/Industrial Worker AOPC 2
Via Inhalation of Outdoor Air

Non-Carcinogenic Calculation			
Compound	CDI (mg/kg-d)	RfD (mg/kg-d)	HQ (unitless)
1,1-dichloroethene	2.01E-07	9.00E-03	2.24E-05
1,2,4-trimethylbenzene	3.87E-10	2.00E-03	1.93E-07
1,3,5-trimethylbenzene	7.10E-10	2.00E-03	3.55E-07
aroclor 1248	5.55E-14	7.00E-05	7.92E-10
aroclor 1254	5.55E-14	7.00E-05	7.92E-10
aroclor 1260	5.85E-14	7.00E-05	8.36E-10
arsenic	NA	3.00E-04	NA
benzo(a)anthracene	3.61E-13	4.00E-02	9.02E-12
benzo(a)pyrene	7.62E-13	4.00E-02	1.91E-11
benzo(b)fluoranthene	7.76E-13	4.00E-02	1.94E-11
benzo(k)fluoranthene	6.97E-13	4.00E-02	1.74E-11
bis(2-ethylhexyl)phthalate	3.50E-13	2.00E-02	1.75E-11
chrysene	4.15E-13	4.00E-02	1.04E-11
dibenz(a,h)anthracene	2.91E-13	4.00E-02	7.26E-12
fluoranthene	4.01E-13	4.00E-02	1.00E-11
indeno(1,2,3-cd)pyrene	7.21E-13	4.00E-02	1.80E-11
naphthalene	7.31E-13	4.00E-02	1.83E-11
n-butylbenzene	2.32E-10	2.90E-01	8.01E-10
n-propylbenzene	7.28E-10	2.90E-01	2.51E-09
p-cymene	4.24E-11	1.00E-01	4.24E-10
phenanthrene	4.83E-13	3.00E-01	1.61E-12
pyrene	4.35E-13	3.00E-02	1.45E-11
tetrachloroethylene	2.76E-09	1.00E-02	2.76E-07
trichloroethene	7.24E-09	7.35E-03	9.86E-07
xylenes	4.53E-10	2.00E-01	2.27E-09
HQ Summation =			2.4E-05

Carcinogenic Calculation			
Compound	CDI (mg/kg-d)	CSF (mg/kg-d) ₋₁	ILCR (unitless)
1,1-dichloroethene	7.19E-08	NA	NA
1,2,4-trimethylbenzene	1.38E-10	NA	NA
1,3,5-trimethylbenzene	2.54E-10	NA	NA
aroclor 1248	1.98E-14	7.70E+00	1.53E-13
aroclor 1254	1.98E-14	7.70E+00	1.53E-13
aroclor 1260	2.09E-14	7.70E+00	1.61E-13
arsenic	NA	1.20E+01	NA
benzo(a)anthracene	1.29E-13	3.90E-01	5.02E-14
benzo(a)pyrene	2.72E-13	3.90E+00	1.06E-12
benzo(b)fluoranthene	2.77E-13	3.90E-01	1.08E-13
benzo(k)fluoranthene	2.49E-13	3.90E-01	9.71E-14
bis(2-ethylhexyl)phthalate	1.25E-13	8.40E-03	1.05E-15
chrysene	1.48E-13	3.90E-02	5.78E-15
dibenz(a,h)anthracene	1.04E-13	4.10E+00	4.25E-13
fluoranthene	1.43E-13	NA	NA
indeno(1,2,3-cd)pyrene	2.58E-13	3.90E-01	1.00E-13
naphthalene	2.61E-13	NA	NA
n-butylbenzene	8.30E-11	NA	NA
n-propylbenzene	2.60E-10	NA	NA
p-cymene	1.51E-11	NA	NA
phenanthrene	1.73E-13	NA	NA
pyrene	1.56E-13	NA	NA
tetrachloroethylene	9.86E-10	2.10E-02	2.07E-11
trichloroethene	2.59E-09	1.00E-02	2.50E-11
xylenes	1.62E-10	NA	NA
ILCR Summation =			4.9E-11

Table B-23
Summary of Potential Health Effects
Off-Site Commercial/Industrial Worker

<u>Exposure Pathway</u>	Receptor Hazard Quotient
Inhalation of Outdoor Air	2.5E-05
Total Population Hazard Quotient =	2.5E-05
<u>Exposure Pathway</u>	Receptor Incremental Lifetime Cancer Risk
Inhalation of Outdoor Air	5.2E-11
Total Population Incremental Lifetime Cancer Risk =	5.2E-11

Table B-24
Summary of Risk Quantitation
Off-Site Commercial/Industrial Worker
Via Inhalation of Outdoor Air

Intake Equation	=	CS X EF X ED X ET X IR BW X AT
IR	Inhalation rate of gases (RAGS, 1989)	0.83 m³/h
EF	Exposure frequency	125 days/year
EDn	Exposure duration for non-carcinogens	25 year
EDc	Exposure duration for carcinogens	25 year
BW	Body weight	70 kg
ATc	Average time for carcinogens (lifetime)	25550 days
ATn	Average time for non-carcinogens (EDn x 365)	9125 days
ET	Exposure time outdoors	8 h/d
Ci	Concentration of chemicals indoors	(see Table 5-6)
Chemical Concentrations		
Compound	Concentration (mg/m³)	Concentration (mg/m³)
1,1-dichloroethene	6.57E-06	NA
1,2,4-trimethylbenzene	7.04E-09	8.90E-09
1,3,5-trimethylbenzene	2.01E-08	2.54E-08
aroclo 1248	NA	1.54E-09
aroclo 1254	NA	NA
aroclo 1260	NA	NA
arsenic	NA	1.36E-07
benzo(a)anthracene	NA	1.66E-07
benzo(a)pyrene	NA	1.70E-08
benzo(b)fluoranthene	NA	NA
benzo(k)fluoranthene	NA	NA
bis(2-ethylhexyl)phthalate	NA	NA
chrysene	NA	NA
dibenz(a,h)anthracene	NA	NA
fluoranthene	NA	NA
indeno(1,2,3-cd)pyrene	NA	NA

Table B-24 (cont.)
Summary of Risk Quantitation
Off-Site Commercial/Industrial Worker
Via Inhalation of Outdoor Air

Non-Carcinogenic Calculation				
Compound	CDI (mg/kg-d)	RID (mg/kg-d)	HQ (unitless)	
1,1-dichloroethene	2.13E-07	9.00E-03	2.37E-05	
1,2,4-trimethylbenzene	2.29E-10	2.00E-03	1.14E-07	
1,3,5-trimethylbenzene	6.53E-10	2.00E-03	3.26E-07	
aroclor 1248	NA	7.00E-05	NA	
aroclor 1254	NA	7.00E-05	NA	
aroclor 1260	NA	7.00E-05	NA	
arsenic	NA	3.00E-04	NA	
benzo(a)anthracene	NA	4.00E-02	NA	
benzo(a)pyrene	NA	4.00E-02	NA	
benzo(b)fluoranthene	NA	4.00E-02	NA	
benzo(k)fluoranthene	NA	4.00E-02	NA	
bis(2-ethylhexyl)phthalate	NA	2.00E-02	NA	
chrysene	NA	4.00E-02	NA	
dibenz(a,h)anthracene	NA	4.00E-02	NA	
fluoranthene	NA	4.00E-02	NA	
indeno(1,2,3-cd)pyrene	NA	4.00E-02	NA	
naphthalene	NA	4.00E-02	NA	
n-butylbenzene	2.89E-10	2.90E-01	9.97E-10	
n-propylbenzene	8.25E-10	2.90E-01	2.85E-09	
p-cymene	5.00E-11	1.00E-01	5.00E-10	
phenanthrene	NA	3.00E-01	NA	
pyrene	NA	3.00E-02	NA	
tetrachloroethene	4.42E-09	1.00E-02	4.42E-07	
trichloroethene	5.39E-09	7.35E-03	7.34E-07	
xylenes	5.52E-10	2.00E-01	2.76E-09	
				HO Summation = 2.5E-05

LLCB Summation = 532E-11

WHO Summation = 2.5E-05

Table B-25
Summary of Potential Health Effects
Off-Site RME Resident Adult

<u>Exposure Pathway</u>	<u>Receptor Hazard Quotient</u>
Inhalation of Outdoor Air	1.2E-06
Total Population Hazard Quotient =	1.2E-06

<u>Exposure Pathway</u>	<u>Receptor Incremental Lifetime Cancer Risk</u>
Inhalation of Outdoor Air	2.9E-12
Total Population Incremental Lifetime Cancer Risk =	2.9E-12

Table B-26
Summary of Risk Quantitation
Off-Site RME Resident Adult
Via Inhalation of Outdoor Air

Intake Equation	$CS \times EF \times ED \times ET \times IR$ = $BW \times AT$	Compound	Concentration (mg/m ³)	Concentration (mg/m ³)
IR	Inhalation rate of gases (RAGS, 1989)	naphthalene	NA	NA
EF	Exposure frequency	n-butylbenzene	4.96E-11	4.96E-11
EDn	Exposure duration for non-carcinogens	n-propylbenzene	1.1E-10	1.41E-10
EDc	Exposure duration for carcinogens	p-cymene	8.57E-12	8.57E-12
BW	Body weight	phenanthrene	NA	NA
ATc	Average time for carcinogens (lifetime)	pyrene	NA	NA
ATn	Average time for non-carcinogens (EDn x 365)	tetrachloroethene	7.61E-10	7.61E-10
ET	Exposure time	trichloroethene	9.09E-10	9.09E-10
Ci	Concentration of chemicals Outdoors (see Table 5-6)	xylenes	9.47E-11	9.47E-11
Chemical Concentrations				
Compound	Concentration (mg/m ³)			
1,1-dichloroethene	3.63E-08			
1,2,4-trimethylbenzene	3.83E-11			
1,3,5-trimethylbenzene	1.11E-10			
aroclor 1248	NA			
aroclor 1254	NA			
aroclor 1260	NA			
arsenic	NA			
benzo(a)anthracene	NA			
benzo(a)pyrene	NA			
benzo(b)fluoranthene	NA			
benzo(k)fluoranthene	NA			
bis(2-ethylhexyl)phthalate	NA			
chrysene	NA			
dibenz(a,h)anthracene	NA			
fluoranthene	NA			
indeno[1,2,3-cd]pyrene	NA			

Table B-26 (cont.)
Summary of Risk Quantitation
Off-Site RME Resident Adult
Via Inhalation of Outdoor Air

Non-Carcinogenic Calculation			
Compound	CDI (mg/kg-d)	RfD (mg/kg-d)	HQ (unitless)
1,1-dichloroethene	9.96E-09	9.00E-03	1.11E-06
1,2,2-trimethylbenzene	1.05E-11	2.00E-03	5.23E-09
1,3,5-trimethylbenzene	3.03E-11	2.00E-03	1.51E-08
aeroclor 1248	NA	7.00E-05	NA
aeroclor 1254	NA	7.00E-05	NA
aeroclor 1260	NA	7.00E-05	NA
arsenic	NA	3.00E-04	NA
benzo(a)anthracene	NA	4.00E-02	NA
benzo(a)pyrene	NA	4.00E-02	NA
benzo(b)fluoranthene	NA	4.00E-02	NA
benzo(k)fluoranthene	NA	4.00E-02	NA
bis(2-ethylhexyl)phthalate	NA	2.00E-02	NA
chrysene	NA	4.00E-02	NA
dibenz(a,h)anthracene	NA	4.00E-02	NA
fluoranthene	NA	4.00E-02	NA
indeno(1,2,3-cd)pyrene	NA	4.00E-02	NA
naphthalene	NA	4.00E-02	NA
n-butylbenzene	1.35E-11	2.90E-01	4.67E-11
n-propylbenzene	3.85E-11	2.90E-01	1.33E-10
p-cymene	2.34E-12	1.00E-01	2.34E-11
phenanthrene	NA	3.00E-01	NA
pyrene	NA	3.00E-02	NA
tetrachloroethene	2.08E-10	1.00E-02	2.08E-08
trichloroethene	2.48E-10	7.35E-03	3.37E-08
xylenes	2.58E-11	2.00E-01	1.29E-10
HQ Summation =			1.2E-06

Carcinogenic Calculation			
Compound	CDI (mg/kg-d)	CSF (mg/kg-d) ⁻¹	ILCR (unitless)
1,1-dichloroethene	4.27E-09	NA	NA
1,2,4-trimethylbenzene	4.48E-12	NA	NA
1,3,5-trimethylbenzene	1.30E-11	NA	NA
aeroclor 1248	NA	7.70E+00	NA
aeroclor 1254	NA	7.70E+00	NA
aeroclor 1260	NA	7.70E+00	NA
arsenic	NA	1.20E+01	NA
benzo(a)anthracene	NA	3.90E-01	NA
benzo(a)pyrene	NA	3.90E+00	NA
benzo(b)fluoranthene	NA	3.90E-01	NA
benzo(k)fluoranthene	NA	3.90E-01	NA
bis(2-ethylhexyl)phthalate	NA	8.40E-03	NA
chrysene	NA	3.90E-02	NA
dibenz(a,h)anthracene	NA	4.10E+00	NA
fluoranthene	NA	NA	NA
indeno(1,2,3-cd)pyrene	NA	3.90E-01	NA
naphthalene	NA	NA	NA
n-butylbenzene	5.80E-12	NA	NA
n-propylbenzene	1.65E-11	NA	NA
p-cymene	1.00E-12	NA	NA
phenanthrene	NA	NA	NA
pyrene	NA	NA	NA
tetrachloroethene	8.90E-11	2.10E-02	1.87E-12
trichloroethene	1.06E-10	1.00E-02	1.06E-12
xylenes	1.11E-11	NA	NA
ILCR Summation =			2.9E-12

Table B-27
Summary of Potential Health Effects
Off-Site RME Resident Child

<u>Exposure Pathway</u>	Receptor Hazard Quotient
Inhalation of Outdoor Air	5.5E-06
Total Population Hazard Quotient =	5.5E-06

<u>Exposure Pathway</u>	Receptor Incremental Lifetime Cancer Risk
Inhalation of Outdoor Air	2.7E-12
Total Population Incremental Lifetime Cancer Risk =	2.7E-12

Table B-28
Summary of Risk Quantitation
Off-Site RME Resident Child
Via Inhalation of Outdoor Air

Intake Equation	CS X EF X EDX ET X IR BW X AT	=	
IR	Inhalation rate of gases (RAGS, 1989)	0.83 m³/h	
EF	Exposure frequency	350 days/year	
EDn	Exposure duration for non-carcinogens	6 year	
EDc	Exposure duration for carcinogens	6 year	
BW	Body weight	15 kg	
ATc	Average time for carcinogens (lifetime)	25550 days	
ATn	Average time for non-carcinogens (EDn x 365)	2190 days	
ET	Exposure time	24 h/d	
Ci	Concentration of chemicals Outdoors (see Table 5-6)		
Chemical Concentrations			
Compound	Concentration (ng/m³)	Concentration (ng/m³)	
1,1-dichloroethene	3.6E-08	naphthalene	NA
1,2,4-trimethylbenzene	3.8E-11	n-butylbenzene	4.96E-11
1,3,5-trimethylbenzene	1.1E-10	n-propylbenzene	1.41E-10
aroclor 1248	NA	p-synene	8.57E-12
aroclor 1254	NA	phenanthrene	NA
aroclor 1260	NA	pyrene	NA
arsenic	NA	tetrachloroethene	7.61E-10
benzo(a)anthracene	NA	trichloroethene	9.09E-10
benzo(a)pyrene	NA	xylenes	9.47E-11
benzo(b)fluoranthene	NA		
benzo(k)fluoranthene	NA		
bis(2-ethylhexyl)phthalate	NA		
chrysene	NA		
dibenz(a,h)anthracene	NA		
fluoranthene	NA		
indeno(1,2,3-cd)pyrene	NA		

Table B-28 (cont.)
Summary of Risk Quantities
Off-Site RME Resident C
Via Inhalation of Outdoor

Non-Carcinogenic Calculation				
Compound	CDI (mg/kg-d)	RD (mg/kg-d)	HQ (unitless)	
1,1-dichloroethene	4.65E-08	9.00E-03	5.16E-06	
1,2,4-trimethylbenzene	4.88E-11	2.00E-03	2.44E-08	
1,3,5-trimethylbenzene	1.41E-10	2.00E-03	7.07E-08	
arcoior 1248	NA	7.00E-05	NA	
arcoior 1254	NA	7.00E-05	NA	
arcoior 1260	NA	7.00E-05	NA	
arsenic	NA	3.00E-04	NA	
benzo(a)anthracene	NA	4.00E-02	NA	
benzo(a)pyrene	NA	4.00E-02	NA	
benzo(b)fluoranthene	NA	4.00E-02	NA	
benzo(k)fluoranthene	NA	4.00E-02	NA	
bis(2-ethylhexyl)phthalate	NA	2.00E-02	NA	
chrysene	NA	4.00E-02	NA	
dibenz(a,h)anthracene	NA	4.00E-02	NA	
fluoranthene	NA	4.00E-02	NA	
indeno(1,2,3-cd)pyrene	NA	4.00E-02	NA	
naphthalene	NA	4.00E-02	NA	
n-butylbenzene	6.32E-11	2.90E-01	2.18E-10	
n-propylbenzene	1.80E-10	2.90E-01	6.19E-10	
p-cymene	1.09E-11	1.00E-01	1.09E-10	
phenanthrene	NA	3.00E-01	NA	
pyrene	NA	3.00E-02	NA	
terachloroethene	9.69E-10	1.00E-02	9.69E-08	
trichloroethene	1.16E-09	7.35E-03	1.57E-07	
xylenes	1.21E-10	2.00E-01	6.03E-10	

Compound	Carcinogenic Calculation		
	CDI (mg/kg-d)	CSF (mg/kg-d) ₋₁	ILCR (unitless)
1,1-dichloroethene	3.98E-09	NA	NA
1,2,4-trimethylbenzene	4.18E-12	NA	NA
1,3,5-trimethylbenzene	1.21E-11	NA	NA
aeroclor 1248	NA	7.70E+00	NA
aeroclor 1254	NA	7.70E+00	NA
aeroclor 1260	NA	7.70E+00	NA
arsenic	NA	1.20E+01	NA
benzo(a)anthracene	NA	3.90E-01	NA
benzo(a)pyrene	NA	3.90E+00	NA
benzo(b)fluoranthene	NA	3.90E-01	NA
benzo(k)fluoranthene	NA	3.90E-01	NA
bis(2-ethylhexyl)phthalate	NA	8.40E-03	NA
chrysene	NA	3.90E-02	NA
dibenz(a,h)anthracene	NA	4.10E+00	NA
fluoranthene	NA	NA	NA
indenol(1,2,3-cd)pyrene	NA	3.90E-01	NA
naphthalene	NA	NA	NA
n-butylbenzene	5.41E-12	NA	NA
n-propylbenzene	1.54E-11	NA	NA
p-cymene	9.35E-13	NA	NA
phenanthrene	NA	NA	NA
pyrene	NA	NA	NA
tetrachloroethene	8.31E-11	2.10E-02	1.74E-12
trichloroethene	9.92E-11	1.00E-02	9.92E-13
xylenes	1.03E-11	NA	NA

ILCR Summation = 2.7E-12

HO Summation = 5 SE-06



INTEGRATED
Environmental Services, Inc.

March 6, 1998

Via Federal Express

Karen Baker
California Environmental Protection Agency
Department of Toxic Substances Control
Hazardous Waste Management Program
245 West Braodway, Suite 425
Long Beach, CA 90802

**SUBJECT: POST-DEMOLITION RISK ASSESSMENT
BOEING C-6 FACILITY, PARCEL A, LOS ANGELES, CALIFORNIA**

Dear Ms. Baker:

On behalf of Boeing Realty Corporation, Integrated Environmental Services Inc. is pleased to submit for your review the attached document pertaining to the C-6 facility, Parcel A. We are delighted to report that the incorporation of DTSC's review comments has resulted in a reduction of projected risks.

As detailed in the report, the findings depend on the agreed upon removal of the eight arsenic hot spots. Confirmation sampling will be conducted in accordance with the site sampling and analysis plan, and results will be provided to your office as soon as available.

A response document has been included to address each of the comments issued by Dr. Oudiz. Furthermore, the report has been prepared in revision mode to highlight all changes from the previous submission. New text has been underlined. Revision bars appear in the right margin to indicate either an addition or deletion.

Thank you for your guidance on this important project. I look forward to discussing the details with you. Please contact me at (714) 813-8568 if you need further information.

Very truly yours,

Chris Stoker
Program Manager

cc: D. Oudiz, DTSC HERD
J. Ross, RWQCB-LA
S. M. Stavale, Boeing

encl: 1 copy, 6 books

INTEGRATED
Environmental Services, Inc.

Post-Demolition Risk Assessment

**Boeing Realty Corporation
C-6 Facility, Parcel A**

**Los Angeles, California
March 6, 1998**

Prepared by

**Integrated Environmental Services, Inc.
Newport Beach, California**

for

**Boeing Realty Corporation
Long Beach, California**





RESPONSE TO COMMENTS
IN
MEMORANDUM DATED FEBRUARY 26, 1998
FROM CAL/EPA DEPARTMENT OF TOXIC SUBSTANCES CONTROL
REGARDING
POST-DEMOLITION RISK ASSESSMENT, BOEING C-6 FACILITY, PARCEL A
LOS ANGELES, CALIFORNIA (FEBRUARY 1998)

General Comments

Parcel A has been extensively and thoroughly characterized and the soil sampling data presented in the Phase II Soil Characterization document appear to be adequate and appropriate for use in the risk assessment. HERD assumes that both DTSC and the LARWQCB have evaluated these data and that the data meet all criteria for QA/QC. DTSC regional staff have not reviewed the soil confirmation reports (MW 1997a, 1997b, 1997c, 1997d, 1997e), and HERD has not received the documents. We recommend that the LARWQCB review these documents if they have not done so already. For the most part, the data presented in the Phase II Soil Characterization do not suggest that there are extremely contaminated areas in Parcel A. The current human health risk assessment (HRA) predicts relatively low cancer risks (below 10E-06) and hazard indices (HI) below 1 for the exposure scenarios evaluated in the main portion of the text (page 6-11). While HERD has a number comments on the risk assessment procedures, we do not anticipate that risk estimates will be elevated to levels which would pose a significant risk, with a few notable hot spot exception (see General Comment 3). The recalculated risks may be in the range of 1×10^{-5} cancer risk. The following are major concerns which need to be addressed in any revised document. Specific Comments are included in the next section.

Comment 1

The exposure scenarios are based upon a deed restriction for this property. DTSC/HERD do not know what the extent or content of this deed restriction will be, and therefore, we are at a disadvantage in reviewing the HRA. At various points in the HRA it is stated that a deed restriction will be instituted to presumably limit development to industrial uses; that the deed restriction will include prevention of water usage from underlying aquifers; and that agricultural use of the land will be prohibited. It is also implied that since the parcel is designated industrial use, that it will be paved and direct soil contact exposures will be eliminated for certain exposure scenarios. It is not clear if a maintained cap is proposed as a part of the deed restriction, or if this is just a future use assumption. If a maintained cap is not included in the deed restriction, it cannot be assumed that one will exist under all property uses in the future. Clarification on the content and extent of the deed restriction are needed in order to support the assumptions in the HRA.



Response 1

As documented in the post-demolition risk assessment, the deed restrictions for Parcel A have not been completed. These deed restrictions will limit future development to light commercial/industrial use. In addition, these deed restrictions will prohibit the development of domestic or production wells on the property. These two constraints are the only deed restrictions assumed in the post-demolition risk assessment. Other assumptions, such as the use of clean, imported fill material are not controlled under the proposed deed restrictions.

While it is acknowledged that provisions for maintaining the clean-fill layer are not incorporated into the deed restrictions and thus cannot eliminate direct exposures, it is also recognized that this imported material would significantly reduce the likelihood of exposure under non-intrusive conditions. It is these non-intrusive conditions that future site users have the highest probability of encountering. Therefore, Integrated and DTSC have agreed to provide an intrusive commercial/industrial scenario and a non-intrusive commercial/industrial scenario. This provides the anticipated range of possible risks without provisions for maintenance of the clean-fill layer.

Comment 2

The only sampling data that are presented in the HRA are the log 95%UCL and maximum concentrations for chemicals of potential concern (COPCs). It is stated on pages 2-2 and 2-3 that soil data for the HRA were taken from the Phase II Soil Characterization (July 1997) and from soil confirmation reports (MW 1997a, 1997b, 1997c, 1997d, 1997e). DTSC and HERD have not reviewed the soil confirmation reports which the HRA data were, in part, based. The HRA document must be sufficiently complete to support the risk analyses contained in it. In order to accomplish this, a summary of data set on which the analyses are based on must be included in the document. At minimum this should include detection limits, minimum and maximum detections, arithmetic mean, 95%UCL (if sufficient number of samples), depth and location of samples. Currently, HERD does not know which data were used for the calculation of risks on Parcel A. A complete set of the data used in the HRA should be made available to DTSC. In order to expedite review of the project, HERD requests that the data set used for the HRA be submitted in an electronic format so that it can be evaluated. Furthermore, HERD requests that DTSC regional staff review the HRA data base and verify the acceptability of the data.

Response 2

Appendix C has been added to the post-demolition risk assessment. This appendix summarizes all data found acceptable for use in the Parcel A risk assessment. Statistical summaries for all detected constituents have also been included.



Comment 3

HERD and IES agreed to use the background data from the neighboring site, International Light Metals (ILM) in order to determine which inorganic compounds are related to ambient (background) conditions and which may be related to contamination on Parcel A. At the time, we agreed to compare the background data with the 95% UCL value of the site data set. This approach worked fairly well for most of the inorganic contaminants, identifying them as comparable to background concentrations; however, the approach did not identify what appears to be arsenic contamination on site. The Phase II Soil Characterization document reports 798 samples which were analyzed for arsenic. All but seven of these analyses were below the detection limit of 1 ppm. The seven detections were 12, 14, 36, 55, 90, 150, and 350. All arsenic hits were located in the southern leg on Normandy Avenue, and all except the 12 and 14 ppm hits were in the top 1 to 1.5 feet of soil. The other two hits were both at four feet. It is apparent that the large number of nondetect data points obscured an area with arsenic contaminated soil. The highest hit of arsenic is three orders of magnitude above the USEPA Region IX Residential PRG, and considerably above the background data point cited for the ILM data set. The arsenic values above 14 ppm are considered elevated and attributable to contamination on the site. Arsenic should be added to the COPC list and, where clearly elevated above background, evaluated for risks. The arsenic contamination appears to be localized to the one section, and it may be appropriate to evaluate arsenic as a COPC only for the AOPC (see General Comment 4 for a discussion of AOPCs).

Several of the other metals had maximum concentrations above the background value (log 95% UCL was below the background), but they did not appear as skewed as the arsenic data, with the exception of beryllium. The maximum concentration for beryllium was reported to be 100 ppm, but this value was not reported in the Phase II Soil Characterization report. When the entire data set is received, this discrepancy may be explained.

The entire background data set should be included in the HRA. HERD recommends that other evaluations be considered in the determination of background concentrations in future documents. These may include graphic representation of the distributions, summary statistics, maximum concentrations comparisons, and the Wilcoxon Rank Sum Test. HERD does not necessarily require this for Parcel A at this time if the question of beryllium can be answered and if arsenic is included as a COPC.

Response 3

DTSC and Integrated have revised the selection process for inorganic COPCs to ensure that all detected Class A carcinogens (i.e., arsenic) are included in the post-demolition risk assessment. Furthermore, DTSC and Integrated have agreed that all arsenic hot-spots in AOPC 2 exceeding background should be removed from the site. These sample locations were identified for remediation based on their shallow sample depth and



elevated concentrations. The deeper arsenic concentrations found in AOPC 1 will be included in the post-demolition risk assessment. The findings of the risk assessment will determine the necessity for further arsenic remediation.

As presented in response 2, the requested data set has been provided.

Comment 4

HERD and IES agreed to divide Parcel A into smaller areas of localized contamination for the purposes of the HRA. The Areas of Potential concern (AOPC) were defined by plotting soil data that were above the USEPA Region IX Residential PRGs and visually determining boundaries for these areas. In Figure 5-1, IES defined two AOPCs. One of these areas contained a cluster of semi-volatile compounds, and the other AOPC encompassed the balance of Parcel A. DTSC/HERD disagrees with the division and suggests that AOPC 2 be divided into three AOPCs, in addition to AOPC 1. Proposed AOPC2 would be the southern leg of Parcel A along Normandie Avenue (including WCC-8s); proposed AOPC3 should be the narrow strip from Normandie Avenue along area near WCC-3D to just east of WCC-2s; and proposed AOPC 4 should be the remainder of Parcel A. The proposed AOPC 2 would contain the elevated arsenic samples, which are not included in Figure 5-1.

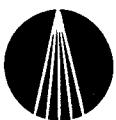
Response 4

DTSC and Integrated evaluated further divisions of AOPC 2 to ensure that exposure point concentrations were not biased as a result of statistical dilution. DTSC and Integrated have agreed that the findings of this analysis indicate no significant difference in exposure point concentrations with further AOPC designations.

Specific Comments

Comment 1

Table 2-1: Many of the USEPA Region IX Residential PRGs do not agree with the August 1, 1996 PRG list. A more current list has not been officially released by USEPA, and HERD has not reviewed any changes to the PRGs from the 1996 list. Furthermore, industrial PRGs were substituted for a number of the residential PRGs. The PRG for Aroclor 1254 on page 2-12 of Table 2-1 should be for the carcinogenic effects, not the noncancer effect. When this PRG is used, this compound should be included as a COPC. Additionally, when the correct PRG is used for indeno(1,2,3-cd)pyrene, this compound should also be included in the COPC list. Correction of the PRGs may also affect the distribution contaminants for the visual determination of the AOPCs.



Response 1

The PRG values in Table 2-1 have been reviewed and modified as necessary. This has added aroclor 1254, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene to the COPC list. The modification of PRGs did not impact the visual determination of the AOPCs.

Comment 2

Page 3-1: While the Potency Equivalency Factors (PEFs) for PAHs quoted in Wade 1994 are correct, it is more appropriate to cite the source of the PEFs, Cancer Potency Factors List (CalEPA/OEHHA 1994). Additionally, these values must be included in the risk assessment and clearly stated how they are being applied, i.e. whether it is an adjustment in the cancer slope factor or the exposure intake.

Response 2

The reference has been changed accordingly.

Comment 3

Table 3-1: A number chronic inhalation RfDs were incorrect and should be changed to the following values:

trimethylbenzenes	0.002 mg/kg-day
naphtalene	0.04 mg/kg-day
n-butylbenzene	0.29 mg/kg-day
n-propylbenzene	0.29 mg/kg-day
p-cymene	0.1 mg/kg-day
xylene	0.2 mg/kg-day

These values should also be checked in the spreadsheets in Appendices. Several incorrect values were carried over into the hazard indices calculations. Reference sources for each of the RfDs should be indicated on the table, not as a general footnote at the bottom.

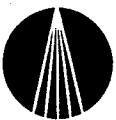
Response 3

The original chronic inhalation toxicity values provided by DTSC were referenced as RfC values, thus requiring adjustment. As noted in the comment, these values should have been referenced as RfDs thereby requiring no further adjustment. Corrections have been made as appropriate, and reference sources have been added for each RfD.

Comment 4

Table 3-1: The nocancer effects of carcinogens should also be considered. The following RfDs should be used for both oral and inhalation exposures:

PAHs	0.04 mg/kg-day (surrogate value)
------	----------------------------------



TCE *7.35E-3 mg/kg-day (DTSC calculated value)*
PCBs *7.0E-05 mg/kg-day (surrogate value)*
bis(2-ethylhexyl)phthalate 2.0E-02 mg/kg-day

Response 4

These values have been incorporated accordingly.

Comment 5

Table 3-2: Please include the inhalation CSFs for the PAHs. The only CSFs that are correct on this table are the ones for the aroclors and dibenzo(a,h)anthracene. Other values are transposed between the oral and inhalation values or wrong. Please check this table and check tables in the Appendices. It should also be indicated that the PAH CSFs are based on benzo(a)pyrene. If PEF adjustments are made on this or other tables, they should be noted.

Response 5

The values in Table 3-2 have been reviewed and corrected.

Comment 6

Table 3-3 and page 3-8: HERD generally doesn't correct the oral cancer slope factors (CSF) for gastrointestinal absorption and calculate a separate dermal CSF. This correction tends to unrealistically increase the risks from dermal exposures unless accurate data are present documenting absorption by both pathways. HERD intended its earlier recommendation in the 11/3/97 memorandum to include both RfDs and CSFs.

Response 6

Table 3-3 has been removed from the document, and page 3-8 has been modified to present HERD's current position on RfDs and CSFs.

Comment 7

Figure 4-1: All complete exposure pathways should be included in the risk assessment. Several of the pathways were listed as insignificant and later dropped from the risk assessment. In particular, the inhalation pathway for VOCs from groundwater was eliminated on pages 4-14 and 5-17 without supporting documentation. Technical justification for determining that his pathway should be eliminated should be incorporated into the document.



Response 7

The insignificant pathways presented in Figure 4-1 have been previously agreed upon by DTSC and Boeing. These insignificant pathways have been footnoted in the document for clarification.

Comment 8

Figure 4-1 and page 4-14: The exposure parameters for the construction worker and industrial/commercial worker scenarios were addressed in the November 3, 1997 and January 29, 1998 memoranda from Dr. Deborah Oudiz to Karen Baker. While these memoranda addressed the draft Health Based Remedial Goals (which were not approved or finalized), IES discussed using the protocols as a workplan for the current risk assessment. In the 11/3/97 memorandum, the exposure frequency for the construction worker was set at 250 days/year with a one year exposure duration. This scenario was also designed to address an intrusive maintenance worker scenario.

During the February 9, 1998 meeting in Sacramento with IES, it was agreed that the commercial/industrial scenario would include direct soil contact exposure pathways, including ingestion, dermal, and inhalation. Standard exposure assumptions apply, except for the following revised exposure parameters:

Exposure frequency = 125 days/year

Skin surface area = 2020 cm²

The commercial/industrial scenario in the main body of the document only considered inhalation of VOCs in outdoor and indoor air. The exposure scenario, which was requested by HERD, is in Appendix C. HERD strongly believes that these belong in the body of the document and any risk management decisions should be based on the complete exposure scenarios. While we understand that the proposed development of Parcel A includes paving and landscaping all areas outside of buildings, there are no assurances that future use of the land will present different property developments and exposures. Unless a maintained cap is written into the deed restriction, all reasonable long term industrial uses of the property must be considered. When HERD determines that residual contamination on a property does not present significant health risk, it must include the possibility that the soil may not be capped. Direct contact exposures to commercial/industrial workers must be assessed, including ingestion, dermal, and inhalation of vapors and particulates.

In addition, the offsite worker and resident exposure scenario should include inhalation exposure to contaminated particulates from the site.



Response 8

The exposure parameters for all receptors were modified and submitted to DTSC on February 28, 1998, for review and approval. These agreed upon exposure parameters have been incorporated into the latest version of the risk assessment.

The commercial/industrial worker previously addressed in Appendix C has been incorporated into the main body of the document.

Particulate exposures to the on-site construction worker and commercial/industrial worker were found to be insignificant. Exposures to these on-site receptors are significantly greater than exposures to off-site receptors; therefore, exposures to off-site receptors were not evaluated.

Comment 9

Tables 4-1, 4-2, and 5-3: Chemical specific parameters from the Soil Screening Guidance: Technical Background Document (USEPA, May 1996) should be preferentially used for any chemical for which there are data. This was requested in the November 3, 1997 memorandum from Dr. Oudiz to Karen Baker. It is not necessary to change the parameters for this assessment, but all future documents should contain the values from the SSL document.

Response 9

Comment noted.

Comment 10

Page 5-2: IES has identified the 0 - 50 ft interval for fate and transport modeling for the air emissions, which HERD agrees with. In addition, the 1-12 ft interval was identified for direct exposure pathways. HERD generally only considers the top 10 feet for direct exposure pathways for residential scenarios, and may consider even shallower depths for industrial exposure scenarios depending upon site specific conditions. IES and Boeing are aware of our approach and have elected to evaluate the soils to depth of 12 feet for direct soil contact exposure pathways.

Response 10

Comment noted.



Comment 11

Page 5-4: Statistical summaries, statistical tests, and other pertinent information is alluded to in this section. These analyses and data summaries should be presented in the document. (See General Comment 2)

Response 11

Statistical and analytical data are presented in Appendix C.

Comment 12

Page 5-5: The calculation of the log 95%UCL must be documented and the equations and input parameters must be in the text. The formulas and calculations should follow the Supplemental Guidance to RAGS: Calculating the Concentration Term (USEPA, May 1992)

Response 12

The GIS Key Statistical Modules Users Guide is presented in Appendix D.

Comment 13

Page 5-19: It is stated that site conditions indicate that transport is governed by diffusive conditions. Please be more specific in the text and substantiate the statement.

Response 13

The Peclet calculations for the determination of transport conditions are presented in Appendix E.

Comment 14

Table 5-6: The particulate emissions should be modeled and added to this table in order to address inhalation pathways. (See Specific Comment 7)

Response 14

As stated in Response 8, particulate emissions do not represent significant exposures to off-site receptors.

Comment 15

Page 5-26: The values for the parameters in equation 5-15 need to be presented in the text.



Response 15

The values for the parameters in equation 5-15 are defined in the text.

Comment 16

Page 5-26: Please present the other equations used to calculate indoor air concentrations after equations 5-14 and 5-15.

Response 16

The text has modified accordingly showing the calculation of indoor air concentrations.

Comment 17

Table 6-2: This table should be corrected with the exposure parameter values outlined in Specific Comment 7 and additional exposure pathways must be added to the commercial/industrial worker and offsite scenarios.

Response 17

Table 6-1 was revised and submitted to DTSC for concurrence. As stated in Response 8, the additional exposure pathways to off-site receptors are insignificant.

Comment 18

Page 6-4 and COPC Intake and Risk Calculation Sheets: Inhalation intake estimates and risks from outdoor (ambient) exposures and indoor exposures should be calculated and presented separately. In order for HERD to determine the relative contributions of each pathway to the overall risk, each pathway must be presented separately. Furthermore, HERD recognizes that IES has essentially double counted the soil emissions into air by assuming that all of the emissions are present in both the ambient air and indoor air. HERD also understands the limitations and conservative estimates that are inherent in the indoor air models. Emissions and risks estimated from these models are used to assess both the necessity of potential remediation strategies as well as to indicate where further investigations are needed. If high risks are predicted for indoor air contamination, HERD will often recommend real time monitoring of structures in order to evaluate the actual emissions in a building. The indoor air emissions are evaluated using scientific judgment and perspective in determining the need for potential remediation on a site.

Response 18

Outdoor and indoor exposures have been presented in separate calculations. However, indoor air concentrations reflect vapor intrusion plus outdoor air introduction through



ventilation. Indoor air risks projected at the site are dominated by air introduced through the ventilation system. The air entering through the floor (vapor intrusion) is insignificant.

Comment 19

Page 6-8: DTSC/HERD considers 1×10^{-6} cancer risk estimate to be a point of departure and the risk management range to be 1×10^{-4} to 1×10^{-6} . The acceptable risk range for a site is the prerogative of the regulating agency and a determination of what value should be established as the significant risk level by IES is not appropriate. HERD considers an HI greater than 1 to be of potential concern, not an HI of 10 as stated in the document. If the HI is at unity, further investigation and evaluation may be warranted, and remedial alternatives may be considered.

Response 19

Text has been modified for clarification, and the reference to an HI of 10 has been removed.

Comment 20

Page 6-11: While it is agreed that a number of HQ's are added which have different organ endpoints, the summation of HQ's also addresses other concerns of multiple chemical exposure. Chemical interactions, the affect of one compromised organ system on the functioning of other organ systems, and multiple insults to systems not well understood, such as the immune system, are at least recognized by the additivity of both noncancer HQ and cancer risks.

Response 20

Comment noted.

Comment 21

Table 6-3: Regulatory maximums should be eliminated from this table since they infer risk management decisions by IES and regulatory actions by DTSC and the LARWQCB.

Response 21

Reference to "regulatory maximums" has been eliminated.



INTEGRATED
ENVIRONMENTAL SERVICES, INC.

SIGNATURES

POST-DEMOLITION RISK ASSESSMENT
BOEING REALTY CORPORATION C-6 FACILITY, PARCEL A
LOS ANGELES, CALIFORNIA

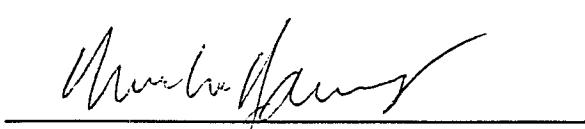
MARCH 6, 1998

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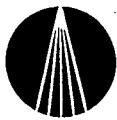


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Senior Toxicologist,
President



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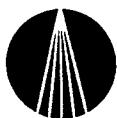


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ACRONYMS

ALCOA	Aluminum Company of America
AOPC	areas of potential concern
BRCA	Boeing Realty Corporation
BTEX	benzene, toluene, ethylbenzene, xylene
Cal/EPA	California Environmental Protection Agency
CAO	Cleanup and Abatement Order
CDI	chronic daily intake
CDM	Camp Dresser McKee
CEM	conceptual exposure model
COPC	constituent of potential concern
CLP	Contract Laboratory Program
CSF	cancer slope factor
CSV	chemical specific value
DAC	Douglas Aircraft Company
DCA	dichloroethane
DCE	dichloroethene
DQO	data quality objective
DTSC	Department of Toxic Substances Control
EHP	Electronic Handbook Publishers
EHRAV	Environmental Handbook of Risk Assessment Values
EPA	Environmental Protection Agency (U.S.)
G&M	Geraghty & Miller, Inc.
GC/MS	gas chromatography/mass spectrometry
GI	gastrointestinal
HBRG	health-based remediation goal
HEAST	Health Effects Assessment Summary Tables
HERD	Human and Ecological Risk Division
HI	hazard index
HQ	hazard quotient
HSDB	Hazardous Substance Data Base
IARC	International Agency for Research on Cancer
ICP/GFAA	Inductively Coupled Plasma/Graphite Furnace Atomic Analyses
IESI	Integrated Environmental Services, Inc.
ILCR	incremental lifetime cancer risk
IRIS	Integrated Risk Information System
ISC2	Industrial Source Complex 2 (Model)
ISCST3	Industrial Source Complex Short-Term 3 (Model)



JMM	James M. Montgomery Consulting Engineers
K/J	Kennedy/Jenks Consultants
LOAEL	lowest-observable-adverse-effect level
LOD	limit of detection
LOQ	limit of quantitation
MW	Montgomery Watson
NIOSH	National Institute of Occupational Safety and Health
NOAEL	no-observable-adverse-effect level
NLM	National Library of Medicine
NPC	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OSWER	Office of Solid Waste Emergency Response
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PEF	potency equivalence factor
PID	photo-ionization detector
POE	point of exposure
PRG	preliminary remediation goal
QA/QC	quality assurance/quality control
RAGS	Risk Assessment Guidance for Superfund
RfC	reference concentration
RfD	reference dose
RI/FS	remedial investigation/feasibility study
RME	reasonable maximum exposure
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SCAQMD	South Coast Air Quality Management District
SEAM	Superfund Exposure Assessment Model
SRC	Syracuse Research Corporation
SVOC	semi-volatile organic compound
TCA	trichloroethane
TCE	trichloroethylene
TOXNET	Toxicology Data Network
TPH	total petroleum hydrocarbon
TRPH	total recoverable petroleum hydrocarbon
UCL	upper confidence limit
UST	underground storage tank
VOC	volatile organic compound
WCC	Woodward-Clyde Consultants